Discs on the Exe

From protostellar discs to debris discs and planets

Contributed Posters

1 Protoplanetary disc formation, clusters and Class 0/I discs

1.1 The photo-evaporation of protoplanetary discs in young stellar clusters # Poster 1

Presenter: Megan Allen
Affiliation: University of Sheffield

Observations and simulations show protoplanetary discs are strongly affected by stellar birth environments, and most star-forming regions disperse on timescales similar to the evolution of protoplanetary discs. A significant agent in the destruction of discs is FUV radiation from massive stars. However, some star-forming regions live much longer than the typical timescale for disc destruction, and we don't know whether stars with discs destroyed by FUV radiation from massive stars always remain in the star-forming region, or are ejected by dynamical encounters. The tidal field from the host galaxy can cause stars to leave and then re-enter a star-forming region, with significant implications for the survivability of the stars' discs. In this contribution, I will present the results from a large suite of N-body simulations and discuss the effects of various initial conditions of star-forming regions on the pathways stars take, and on the survival of their protoplanetary discs.

1.2 Dust Disk Evolution and Planetesimal Formation Under an Early Inflationary Phase # Poster 2

Presenter: Sarah E. Anderson
Affiliation: Observatoire de la Cote d'Azur

Understanding where and when planetesimals form is a necessary first step toward reconstructing planet formation in the Solar System. Building on our previous work (Marschall & Morbidelli 2023), we revisit the conditions required for a protoplanetary disk to reproduce key Solar System constraints, including an extended dust disk, multiple planetesimal formation sites, and outward transport of CAIs. We present several improvements to our disk evolution and dust growth model, and compare our results with alternative scenarios proposed in recent years. In particular, we explore the consequences of these updated models for planetesimal formation near the silicate line. Our results refine the picture of an early inflationary phase driven by rapid disk expansion and highlight how the interplay between infall, viscosity, and fragmentation can shape the radial distribution of solids, providing new constraints on the earliest stages of Solar System assembly.

1.3 Dust growth and dynamics during star and disc formation # Poster 3

Presenter: Matthew Bate
Affiliation: University of Exeter

Planet formation in the discs around young stars involves the coagulation of submicrometre-sized dust grains into much larger grains that may be mixed by turbulence and migrate through the disc. We have recently combined methods for modelling dust grain coagulation, gas drag, and turbulent mixing with an existing smoothed particle hydrodynamics (SPH) code. This allows us, for the first time, to perform three-dimensional hydrodynamical simulations that follow dust growth, mixing and migration during the early stages of star formation and the formation, growth, and evolution of a young protoplanetary disc.

1.4 The Impact of Radiation Environment on the Evolution and Fragmentation of Protostellar Discs # Poster 4

Presenter: Matt Cusack
Affiliation: Cardiff University

We present 7 high-resolution zoom-in simulations of molecular clouds exposed to an interstellar radiation field and cosmic ray ionisation rate up to 1000 times solar. We detail the evolution of the first discs to form in each simulation for up to 100 kyr. Both the discs and host stars exposed to a stronger radiation field tend to be more massive. All the discs show evidence of recurrent instability during the simulations, but only some fragment. We investigate whether stability metrics can predict fragmentation, but find them unable to do so as the discs appear stable even close to the point of fragmentation. In solar environments, fragments are of planetary mass and often migrate to the centre of the disc, whereas fragments in a high-radiation environment are massive and disrupt the progenitor disc. We conclude that the evolution and properties of discs depend on both their radiation and physical environment.

1.5 Molecular Line Radiative Transfer Modeling of C18O toward L1527IRS and the eDisk Protostars # Poster 5

Presenter: Blake Drechsler
Affiliation: University of Virginia

Obtaining accurate models of protostellar disks is vital for understanding many aspects of protostellar evolution. By modeling the gas kinematics from the C18O ALMA data of the disk, we can obtain robust estimates of the protostellar mass, its most defining characteristic. Constraining the density distribution of disks allows us to determine if the conditions are favorable for planet formation, as well enabling estimates of the accretion rate. In this project, we performed radiative transfer modeling of the disk around the edge-on Class 0 protostar L1527 IRS. By implementing a more realistic temperature structure and more advanced fitting techniques, we show we are able to obtain significantly better fits to the data. After using L1527 IRS as a test case, we will extend this study to model the other sources of the eDisk survey, leading to the largest sample of robust protostellar masses to date.

1.6 From Cloud to Core: Early Dust Enrichment in Forming Disks # Poster 6

Presenter: Vardan Elbakyan
Affiliation: University of Duisburg-Essen

When and how solids grow set the initial conditions for planet formation. We ran 3D molecular cloud collapse simulations, following collapse through first hydrostatic core formation and $\approx$12 kyr of subsequent disk evolution. To probe growth limits, a controlled suite of runs capped the maximum grain size between 10 μm and 100 cm, representing electrostatic, bouncing, fragmentation and radial-drift barriers. Dust growth begins during envelope contraction, producing a dust-enriched disk. Settling concentrates grown grains in the midplane, producing strong local departures from the canonical 1:100 dust-to-gas ratio while the global ratio remains $\approx$1:100. Barriers shape outcomes: $\leq$100 μm regimes match electrostatic/bouncing limits, larger sizes are fragmentation/drift-limited, and fragmentation/drift cases develop steep negative radial grain-size gradients - favouring constant Stokes number treatments over fixed-size approximations. Early enrichment can therefore accelerate planet formation and argues for spatially resolved grain-size modelling.

1.7 Insights into early stages of disk evolution # Poster 7

Presenter: Fabiola Antonietta Gerosa
Affiliation: University College London (UCL)

Recent ALMA observations of embedded Class 0/I protoplanetary disks have revealed new insights into the evolution of gas and dust in these early stages, enabling comparisons with evolved Class II disks. Moreover, growing observational evidence suggests that planets may begin to form in these embedded phases. To investigate this, we perform hydrodynamical simulations of disks forming from the collapse of molecular cloud cores and follow their early evolution under self-gravity and viscosity. Our aim is to identify the key properties and physical processes that operate in the earliest disk stages and might influence the possible outcome of the planet formation process. Comparing with observations of young disks, we find that while our results agree with various observational constraints, viscous evolution and self-gravity alone can hardly reproduce the least massive disks. More complex models that include the impact of the star-forming environment may be needed to address this problem.

1.8 Generating magnetic fields in self-gravitating accretion discs # Poster 8

Presenter: Andrej Hermann
Affiliation: Leibniz Institute for Astrophysics Potsdam (AIP)

Magnetorotational instability (MRI) is commonly considered the main driver of magnetic field generation in protoplanetary discs. However, recent studies suggest that this dynamo is suppressed when non-ideal magnetohydrodynamic effects are included. An alternative mechanism arises in young, massive discs that develop gravito-turbulence, which can sustain dynamo action across a wide parameter range. We investigate the capability of gravito-turbulence to generate magnetic fields, potentially enabling MRI, focusing on the kinematic regime where magnetic backreaction is negligible. Using 3D stratified shearing-box simulations of a self-gravitating disc with the finite-volume NIRVANA-III code, we model the dynamo via the test-field method within the mean-field framework. We identify an α-Ω dynamo whose growth rate scales inversely with the cooling timescale τ_c. The simulations yield α_{yy} values up to 3×10^{-2} and follow a relation $\alpha_{yy} \propto \tau_c^{-0.6}$.

1.9 The effect of MHD winds on the fragmentation of early protostellar disks # Poster 9

Presenter: Noa Hoffmann
Affiliation: Leibniz Institute for Astrophysics Potsdam (AIP)

Observations show that young stellar objects often produce substantial magneto-centrifugal outflows. These outflows are not just a symptom of the interaction between magnetic fields and the disc rotation, but can have a considerable influence on the disc's evolution. We aim to analyse the effects of outflows on the fragmentation of early protoplanetary discs. Using the PLUTO code, we perform 3-dimensional, self-gravitating, MHD cloud collapse simulations to form a central protostar (modelled as a sink particle) with a surrounding disc. We compare the effects of both self-consistently formed and artificially imposed outflows. We find that outflows are not only important in the removal of angular momentum, but also cause a shock front between the cocoon of out-flowing gas and the infalling environment and disc material, respectively. These shocks potentially trigger instabilities in the disc, facilitating fragmentation, possibly leading to the formation of massive planets and brown dwarfs through direct collapse.

1.10 How low-mass main-sequence fast-rotators accrete their spin from their circumstellar discs # Poster 10

Presenter: Rajika Kuruwita
Affiliation: Australian National University

Low-mass main-sequence fast rotators have a rotation period of 2 days or less. Observations find these stars lack exoplanets and probably have unseen stellar companions. This suggests that the formation of fast rotators may be linked to binary star formation.

I will present simulations of binary/multiple star formation via disc fragmentation using 3D MHD simulations of pre-stellar core collapse. I tracked the angular momentum that the primary and companion stars accreted during the simulations. My work found that strong spiral arms in the circumstellar disc dumped high angular momentum material onto the primary star, spinning it up, and strong gravitational instability in this spiral arm could lead to fragmentation and the formation of a companion. I also found that weaker spin-up events could be triggered by a companion perturbing the circumstellar disc of the primary star. I conclude that binary star formation pathways can inherently produce faster-rotating stars.

1.11 Attempting to find the origin of FUor bursts starting from ISM scales # Poster 11

Presenter: Rajika Kuruwita
Affiliation: Australian National University

I present preliminary work attempting to find the origin of FU Orionis-type outbursts starting from ISM scales. Previous models of FUors limit the mass available to drive the burst to the circumstellar disc of the bursting star. However, FUor objects are embedded within molecular clouds that they interact with and accrete from.

From 25au resolution star cluster formation simulations with 2yr cadence sink particle accretion data, I searched for FUor outburst candidates. This was done by cross-correlating a step function with a moving 100yr window over the sink particle accretion profiles. All candidates happened to be in binary star systems, and the cross-correlation found dramatic accretion suppression events at periastron, not bursts. A resolution study of a candidate shows that this accretion suppression is resolved. The candidate's disc was being stripped at periastron, and post-periastron, the candidate's accretion rate increased quickly via Bondi-Hoyle-Lyttleton accretion, until it reached pre-suppression rates.

1.12 A Highly Efficient Poisson Solver for Self-Gravity in Global Simulations of Astrophysical Disks # Poster 12

Presenter: Ankush Mandal
Affiliation: Leibniz Institute for Astrophysics Potsdam (AIP)

Progress in understanding astrophysical disks relies not only on observations and physical modelling, but also on robust numerical tools capable of capturing the complex dynamics of disk systems. Self-gravity plays a key role in many disk environments, driving processes such as spiral structure formation, gravitational instabilities, fragmentation, and planet-disk interactions. Efficient and accurate Poisson solvers are therefore essential for global simulations of disks that span large radial dynamic ranges and exhibit strongly non-axisymmetric structure.

I will present a highly efficient Poisson solver for three-dimensional simulations in cylindrical and spherical geometries, developed to support studies of self-gravitating disks. The method uses azimuthal Fourier decomposition to reduce the Poisson equation to independent two-dimensional Helmholtz equations solved with a geometrically consistent multigrid algorithm. Implemented in the PLUTO code, the solver achieves second-order convergence and excellent weak scaling to thousands of cores, enabling large-scale simulations of self-gravitating disks and related processes across a range of astrophysical environments.

1.13 Disc evolution and multi-planetary system formation in stellar cluster environments # Poster 13

Presenter: Lin Qiao
Affiliation: Queen Mary University of London

Most stars form in dense stellar clusters, so it is important to study how these cluster environments influence disc evolution, planet formation and the final planetary system. External photoevaporation of discs due to massive stars in these clusters depletes planet-forming materials. I will present my studying on how the formation of multiple planetary systems via pebble accretion is affected by external photo-evaporation in a stellar cluster environment.

Another environmental impact is the late stage infall from the ISM in clusters. Disc properties observed are the results of the interplay stellar accretion, mass loss via external photo-evaporation and replenishment from infall via Bondi-Hoyle-Lyttleton accretion. How these processes affect disc properties also depend on the properties of the cluster (e.g. cluster mass, virial ratio). I will also present my research on the effects of different cluster properties on influencing disc evolution due to stellar accretion, infall from ISM, and external photoevaporation.

1.14 Triggered Fragmentation in Self-Gravitating Protoplanetary discs: Cooling, Mass Movement and Instability # Poster 14

Presenter: Pratishtha Rawat
Affiliation: University of Warwick

Previous 3D hydrodynamical simulations of gravitationally unstable discs have shown that a fragment can trigger the formation of subsequent fragments, driven by changes in the surface mass density. This study reanalyses those simulations, considering two different disc masses. Our results demonstrate that both surface mass density and sound speed can contribute to the formation of additional fragments. In addition to the general cooling that occurs in such discs, the inward movement of cool material from the outer disc, driven by the formation of the first fragment, can promote triggered fragmentation in the inner disc. We also identify that interactions between the midplane gas and the cooler upper layers of the disc can facilitate additional cooling. Triggered fragmentation can create a unique planet-formation environment by redistributing material across the disc, potentially leading to chemically distinct fragments compared to those formed in-situ.

1.15 How Does The Star-Forming Environment Impact Planet Formation? # Poster 15

Presenter: Sahl Rowther
Affiliation: University of Warwick

In their youth, protoplanetary discs are expected to be massive enough that their self-gravity drives the evolution of the disc. In this early phase, they are also more likely to be influenced by the star-forming environment. However, simulations of protoplanetary discs typically model isolated discs, neglecting the environment.

In this talk, I will present my results showing how the star-forming environment can shape the evolution of young protoplanetary discs. Using three-dimensional smoothed particle hydrodynamics simulations coupled with live radiative transfer, I will show how gravitational instability and misaligned infalling material results in the formation of planets in warped discs. Finally, I will present synthetic observations to show how the impact of the star-forming environment can influence our interpretation of observations of young protoplanetary discs.

1.16 DIPSY: A new Disc Instability Population SYnthesis # Poster 16

Presenter: Oliver Schib
Affiliation: University of Bern

Disc instability remains the leading formation pathway for a subset of observed giant planets. It, it naturally accounts for giant planets at wide separations, around M-type stars, and in very young systems. Despite this, many aspects of the mechanism remain poorly understood. We have developed a comprehensive model that follows the formation and evolution of a star-disc system. We apply it to conduct a Disc Instability Population SYnthesis (DIPSY). We present the results and discuss the emerging distribution of companions around different stellar types. Our findings indicate that, although fragmentation-the formation of gravitationally bound clumps within the disc, a necessary step for planet formation via disc instability-occurs in only a minority of systems, it often produces at least one companion when it does occur. The outcomes provide new insights for both theoretical studies of planet formation (e.g., hydrodynamic simulations) and future observational searches for companions.

1.17 Elliptic Integral Analysis of Lower and Upper Self-Adjoint Sequences in Riemann S-Type Ellipsoids # Poster 17

Presenter: Howard Cohl
Affiliation:

Since Bernhard Riemann's foundational 1860 treatise on the equilibrium of homogeneous, self-gravitating liquid masses, Riemann S-type ellipsoids have served as crucial models in astrophysics and fluid dynamics for understanding rotating bodies with internal vorticity. A key mathematical challenge in studying the dynamical stability and structural properties of these classical configurations involves the precise evaluation of their self-adjoint sequences. In this study, we perform a comprehensive analysis of the lower and upper self-adjoint sequences of Riemann S-type ellipsoids. Specifically, we formulate and express these sequences explicitly in terms of both Legendre incomplete elliptic integrals and Carlson symmetric elliptic integrals. Furthermore, we conduct a numerical analysis to investigate key properties and behaviors of these sequences across various parametric regimes. This combined analytical and numerical approach not only connects classical astrophysical models with modern elliptic integral formulations, but also provides a more robust framework for the computational evaluation of these equilibrium states.

2 Protoplanetary disc structures and their evolution

2.1 On the global mass distribution of primordial planetesimals with DustPy # Poster 1

Presenter: Stefan Adelbert
Affiliation: MPIA Heidelberg

A fundamental step of planet formation is the gravitational collapse of pebble clouds to form planetesimals. The rate of their formation and more specifically their characteristic sizes depend on the level of local turbulence, either external turbulence by some instability in the gas or internal turbulence created by the dust gas interaction, e.g. the Streaming Instability. We consider flux regulated and sedimentation regulated planetesimal formation in the DustPy simulations of the solar nebula. In addition to previous studies on this topic we use a locally predicted size distribution of primordial planetesimals based on the turbulent Jeans mass and the spectrum of masses based on direct collapse simulations.

2.2 Where do grains grow (or not) in binary systems? A 3D hydrodynamical approach # Poster 2

Presenter: Antoine Alaguero
Affiliation: Institut de Planetologie et d'Astrophysique de Grenoble

Most young stars belong to multiple-star systems, where companion-disc interactions challenge the process of planet formation. In particular, tidal perturbations from companions increase the impact velocity of dust particles, hindering their growth. However, these perturbations also locally enhance the density, like in spiral arms, which may promote dust growth. The balance of these competing effects remains unclear. We performed 3D SPH simulations of discs in binary systems (both circumstellar and circumbinary) accounting for dust growth and fragmentation. We find that companions do not enhance the density-driven growth, when not inhibiting it. Moreover, kinematic collisions between particles further limit grain growth, especially for eccentric companions. As a result, maximum grain sizes can be orders of magnitude smaller than in isolated discs, which prevent the streaming instability to develop. When compared to the exoplanet population, this work highlights the difficulty of forming planets in binary systems in the core accretion scenario.

2.3 Fine-tuning Vision Foundation Models for Protoplanetary Disc Science # Poster 3

Presenter: Leah Albrow
Affiliation: Massachusetts Institute of Technology

High-resolution observations from the Atacama Large Millimetre/submillimetre Array (ALMA) have revealed unprecedented substructure in protoplanetary discs, exposing the limitations of pre-ALMA parametric modelling tools. In moderately inclined discs, both upper and lower molecular emission surfaces are simultaneously visible, yet disentangling them remains algorithmically challenging with existing Gaussian-fitting approaches, which fail to account for non-linear radiative transfer effects. We present a proof-of-concept machine learning framework for multi-class semantic segmentation of emission surfaces in protoplanetary disc channel maps. We fine-tune Meta AI's Segment Anything Model (SAM) on synthetic CO observations generated using the GPU-accelerated radiative transfer code RADJAX, and compare its performance against a 3D volumetric extension, SAM-Med3D, and a custom UNet architecture designed specifically for spectral cube data. This comparison allows us to assess whether large vision foundation models offer meaningful advantages over purpose-built architectures for astronomical imaging tasks, informing future machine learning applications in high-resolution disc science.

2.4 Analysis of the limitations of the gap contrast method to infer the level of vertical diffusion using dust evolution models # Poster 4

Presenter: Juanita Antilen
Affiliation: UCL

Dust evolution models allow us to simulate dust trapping efficiency and the growth of dust particles in protoplanetary discs under different conditions of anisotropic turbulence. In combination with radiative transfer, these models make it also possible to forward modelling continuum substructures with similar morphologies to the substructures in observations, providing synthetic images which can be analysed in a similar way to observations. We study the limitations of the gap contrast method to infer the level of vertical turbulence from observations, and investigate whether we can recover initial conditions of vertical diffusion set in dust evolution models. We test whether the grain size distribution assumptions can impact the constraints found on vertical diffusion; and compare optical depth, mass and temperature conditions between dust evolution models and our best models; additionally, we explore whether it is possible to recover the initial conditions of radial diffusion from the width in continuum substructures.

2.5 From Disk Evolution to Dispersal: Mapping Protostellar Outflows Across 70 Class II Systems with JWST/MIRI # Poster 5

Presenter: Naman Bajaj
Affiliation: Lunar and Planetary Laboratory, The University of Arizona

Jets and winds are increasingly recognized as key drivers of protoplanetary disk evolution and dispersal, yet their precise impact remains unclear. With JWST/MIRI-IFU, we can now spatially resolve these flows in key mid-IR tracers, opening a new window to study their role. We analyze MIRI observations of ∼70 ClassII disks, finding that in over half the sample, [NeII] traces narrow, high-velocity jets, and rotational H_2 lines trace slow, wide-angle winds. On comparison with [OI] spectroscopy, we empirically identify the accretion rate at which these flows transition from molecular to predominantly atomic. Additionally, we find that the detection fraction of H2 winds and [NeII] jets remains constant with stellar mass and increases with accretion rate. Finally, by analyzing the largest sample of spatially resolved ClassII outflows, we test the classic evolution scenario where jets and MHD winds dominate early, driving accretion, then weaken as photoevaporative winds dominate and disperse the disk.

2.6 Synthetic observables with VLTI of dust asymmetries in the inner parts of circumbinary discs # Poster 6

Presenter: Clement Baruteau
Affiliation: CNRS / IRAP, University of Toulouse

Near-infrared interferometric observations using VLTI instruments have opened up a new avenue for exploring the dynamics of the inner regions of circumstellar discs. Modelling the interferometric data can constrain the dust's physical properties in the inner regions of discs. In particular, a dozen of discs observed with GRAVITY or MATISSE at the VLTI exhibit high closure phases suggesting an asymmetric spatial distribution of the dust at a few tenths of an astronomical unit. We are currently exploring various origins for this asymmetry, ranging from a dust-trapping vortex for a single star to an eccentric disc inner edge for a binary star. In this communication, I will talk about the second scenario. For this, I will present synthetic interferometric observations obtained from the results of hydrodynamical simulations post-processed by dust radiative transfer calculations to discuss what dust structures in circumbinary discs would look like if they were observed by the VLTI.

2.7 A Unified View of Disk Evolution: Mapping the Accretion-Ejection Engine with JWST/MIRI # Poster 7

Presenter: Shridharan Baskaran
Affiliation: Tata Institute of Fundamental Research

Understanding how accretion and ejection operate in tandem is essential for explaining protoplanetary disk dispersal and the final mass budget available for planet formation. We present a statistical analysis of over 80 JWST/MIRI archival spectra of Class II disks, enabling a unified investigation of the accretion-outflow engine in the mid-infrared. We validate mid-infrared hydrogen recombination lines ($n = 6$˘14) as robust accretion tracers and provide new empirical relations for the community. We further provide the largest mid-infrared census to date of ejection signatures, revealing a fundamental shift in the mechanical feedback of young stars. By combining the spatial and spectral information from MIRI IFUs, we propose a clear evolutionary sequence governed by this coupling: younger, high-accreting sources drive powerful, shock-excited jets, which transition into systems dominated by wide-angled MHD winds, eventually fading into weak photoevaporative flows as accretion wanes and the inner cavity clears. Simultaneous measurements of mass-flow rates within MIRI spectra allow us to quantify the accretion-ejection coupling efficiency, providing a unified framework for disk evolution.

2.8 A closer look at the WISPIT 2 host star. Evidence for a spectroscopic binary # Poster 8

Presenter: Cade Burgy
Affiliation: MPIA

Despite intensive searches, the detection of protoplanets still embedded in their native discs remains rare. The recently discovered WISPIT 2 system hosts two giant protoplanets in a multi-ringed disc, making it a unique laboratory to study planet formation in progress. We present a spectroscopic characterisation of the WISPIT 2 host star to determine its stellar properties, accretion rate, and inner disc diagnostics, providing a more complete picture of the system. Our observations reveal that WISPIT 2 is a spectroscopic binary. The binary has a period of (4.8 ± 0.1) days, which corresponds to a semi-major axis of 0.072 au or 15.54 $R_\odot$, assuming co-planarity with the disc and a circular orbit. The binary system consists of a young $\sim$0.97 $M_\odot$ primary of spectral type K3 (Teff$\sim$4700 K), and a $\sim$0.33$M_\odot$ secondary (mass ratio $\sim$0.34). We detect weak Hα emission, suggesting little to no ongoing accretion onto the young stars. This discovery makes the WISPIT 2 disc the first circumbinary system with directly imaged protoplanets, establishing this system as a unique benchmark for studying planet formation and disc evolution around binary stars.

2.9 Infall Driven Substructures in Protoplanetary Discs # Poster 9

Presenter: Josh Calcino
Affiliation: Tsinghua University

Observations in both scattered light and molecular lines tracers are increasingly revealing diffuse material surrounding protoplanetary discs, suggesting they are not isolated from their environment. In extreme cases streams of infalling gas and dust, so-called "streamers", are observed colliding with the disc. Using hydrodynamical simulations and radiative transfer, we modelled the effect of streamers colliding onto protoplanetary discs. Streamers affect the gas structure and kinematics, leading to spiral arms and kinematic perturbations that look nearly indistinguishable from the gravitational instability. Our work suggests that the recent evidence of gravitational instability in the disc around AB Aurigae may actually be generated by the observed streamers. The frequency at which streamers are observed in relatively evolved systems such as AB Aurigae suggests that infall cannot be neglected as a source of continuied replenishment of both gas and dust through the disc lifetime.

2.10 The effect of metallicity on disc fragmentation # Poster 10

Presenter: Ethan Carter
Affiliation: University of Lancashire

Fragmentation of gravitationally unstable discs offer an alternate formation mechanism for gas giant planets and brown dwarfs on wide orbits. Metallicity plays a key role in disc evolution from the onset of gravitational instability to the formation of protoplanets. We aim to determine the effect of metallicity on the properties of disc-instability protoplanets. We model the formation and evolution of protoplanets in gravitationally unstable discs with varying metallicity ($Z=[0.01,0.1,0.3,1,3,10]Z_\odot$) using the Smoothed Particle Hydrodynamics code PHANTOM. We find a "sweet- spot" for fragmentation at $Z=0.3Z_\odot$,where cooling is more efficient, with fragmentation also happening less vigorously at higher and lower metallicities. However, away from the sweet-spot fragmentation becomes more difficult and eventually is suppressed at extremely low and high metallicities ($Z=[0.01,10]Z_\odot$), where the disc cools less efficiently. Discs with metallicities close to the sweet-spot form more planets, earlier, and with lower initial masses than discs with higher or lower metallicities.

2.11 Spatially resolving the inner regions of circumstellar discs around young and evolved stars # Poster 11

Presenter: Akke Corporaal
Affiliation: European Southern Observatory

Nowadays, huge efforts are dedicated to answering fundamental questions regarding the timing, locations, and mechanisms of planet formation. To progress on these questions, observations providing high angular resolution are needed, encompassing discs with different environmental properties. Deep comparisons of discs hosted by young stellar objects and evolved post-asymptotic giant branch (post-AGB) binary systems pave the way to advance on these points. I will show recent infrared interferometric observations linking the diverse post-AGB disc environments with their accretion processes, and discuss the circumbinary discs as potential sites for post-main sequence planet formation, given their striking similarities with planet forming discs. Moreover, I will demonstrate the capabilities of the new laser guide star implementation for interferometry for exploring the previously inaccessible regime of faint and compact planet forming discs. Finally, I will contemplate a future vision to study planet formation across stellar evolution by mapping circumstellar dust at currently unresolvable scales.

2.12 Dust characterization of halos - The extended emission in protoplanetary disks # Poster 12

Presenter: Sreejita Das
Affiliation: European Southern Observatory

Extended, low surface brightness continuum emission has been identified in several protoplanetary disks, challenging expectations from radial drift theory. To understand how this emission persists, two possibilities can be considered: viscous spreading of primordial material, or late infall that replenishes the outer regions and forms a secondary disk. In this talk, I will present multi-wavelength ALMA observations of three disks - Elias 2-24, IM Lup, and DM Tau, to investigate the nature and origin of their smooth outer regions, which we refer to as Halos. These regions lack observable pressure traps, raising questions about how the dust there survives. I model the spectral energy distributions and explore how grain composition and porosity influence the derived dust masses. We find that halos hold significant mass reservoirs in the disk of up to 40%. Our key result is that the dust drift timescales are shorter than the system age, indicating that the smooth halos should not survive under isolated evolution. I will also discuss the role of temperature-dependent opacities and whether they may further reduce the detectability of halos, potentially leading to reservoirs of 'dark dust' that do not emit efficiently at (sub-)millimeter wavelengths.

2.13 Inner Disk Structure of Herbig Ae/Be Stars: A Volume-Complete Near-Infrared Interferometric Survey # Poster 13

Presenter: Anuroop Dasgupta Dasgupta
Affiliation: European Southern Observatory

The inner disk structure of Herbig Ae/Be stars remains poorly characterized across the full stellar mass range, as existing interferometric surveys have targeted predominantly bright, well-known objects rather than volume-complete samples. We present a near-infrared interferometric survey of 23 Herbig Ae/Be stars within 1 kpc observed with VLTI/GRAVITY and CHARA, constituting the first volume-complete interferometric characterization of this population. Geometric modeling with \textsc{pmoired} yields inner disk sizes, inclinations, and halo flux fractions for all targets. Stellar parameters are derived via SED fitting with VOSA and \textit{Gaia} DR3 distances. Temperature Gradient Models jointly fitting visibilities and SEDs constrain inner rim radii, temperatures, and power-law indices, which we compare against predicted dust sublimation radii across the full stellar mass range. A companion search via closure phase analysis constrains the binary fraction at sub-au separations. These results establish the inner rim size–luminosity relation and reveal the diversity of inner disk geometries in intermediate-mass pre-main-sequence stars.

2.14 Here be substructures: a VLTI/PIONIER view of the inner rims of dusty post-AGB discs # Poster 14

Presenter: Toon De Prins
Affiliation: Macquarie University & KU Leuven

Protoplanetary discs (PPDs) around young stellar objects are now routinely imaged using high-angular-resolution facilities, and substructures detected in these images serve as signposts of fundamental disc physics and interactions with the central star(s) or embedded companions. Because of their importance for terrestrial planet formation, the dusty inner rims of PPDs remain targets of the highest priority for such imaging studies, yet observers face fundamental challenges due to the small angular and temporal scales involved. A certain class of evolved systems-post-asymptotic giant branch (post-AGB) binaries-is however surrounded by a similar population of dusty discs, whose inner rims are much more favourable to imaging. In this contribution, I present the latest results from VLTI/PIONIER imaging of the inner rims of eight post-AGB discs. I both discuss the implications for post-AGB binaries , and relate the detected substructure candidates to the mechanisms thought to shape inner rims in PPDs.

2.15 Formation of planetary cores during the secular evolution of magnetized protoplanetary disks # Poster 15

Presenter: Timmy Delage
Affiliation: Imperial College London

Protoplanetary disks set the initial conditions for planet formation, yet the role of detailed microphysics in shaping their evolution remains poorly understood. A major open question is how, when, and where initially ISM-like dust grains grow into pebbles and planetesimals, the building blocks of planetary cores. In this talk, I present the first numerical framework for the million-year evolution of protoplanetary disks driven by the magnetorotational instability (MRI). The model captures MRI-driven gas evolution through nonideal magnetohydrodynamic calculations that self-consistently couple dust growth, dust dynamics, and stellar evolution. It uncovers an MRI-powered mechanism that generates both short- and long-lived pressure maxima in the effective MRI-active layer. Within the long-lived pressure maxima, dust is efficiently trapped, grows into pebbles, and reaches dust-to-gas mass ratios high enough to trigger planetesimal formation through the streaming instability. These pebbles and planetesimals can then interact to build planetary cores, paving the way towards planet formation.

2.16 Dust Properties of the HD 163296 Disk from High-Resolution Multi-Wavelength Observations Including ALMA Band 9 (0.45 mm) # Poster 16

Presenter: Kiyoaki Doi
Affiliation: Max Planck Institute for Astronomy

Observational characterization of dust properties in planet-forming disks is essential for understanding the evolution from dust to planets. SED fitting is a powerful method, but it often suffers from degeneracies. We present new high-resolution ALMA Band 9 observations of HD 163296, which serve as a temperature tracer. We perform SED fitting using high-resolution (0.06") ALMA Band 3, 4, 6, 7, and 9 observations covering 0.45 to 3.0 mm and constrain the dust size, surface density, and temperature without temperature assumptions. The inner ring temperature is consistent with a passive-disk model, whereas the inner disk and outer ring are significantly colder, likely due to shadowing. The central disk and rings contain sufficient dust mass to form cores of giant planets, and even the extended outer emission contains more than an Earth mass of dust. These results demonstrate the importance of high-resolution multi-wavelength observations, including high-frequency observations.

2.17 Coagulation and processing of PAHs in disks # Poster 17

Presenter: Carsten Dominik
Affiliation: University of Amsterdam

PAH molecules act as tracers of dust and gas in environments where matter is illuminated by UV photons. Observationally, PAH emission is seen plentifully in Herbig disks, less often in T Tauri disks. Even disks with similar irradiation can sometimes show PAH emission, sometimes not. These differences are due to PAH processing. In circumstellar disks, the high density and turbulent mixing create special conditions in which PAHs can coagulate into clusters, freeze out on grains, and settle away from the photosphere, with consequences for the observability of PAHs in these environments. PAHs in clusters and on grains are no longer reaching high temperatures when absorbing a UV photon and thus drop from sight even though they are still present in the disk. We have developed a detailed understanding of these processes and will discuss the impact on the measured fluxes in PAH features and derived abundances in circumstellar disk photospheres.

2.18 HD98800: probing dust and gas properties using transit observations in a hierarchical quadruple system # Poster 18

Presenter: Juliana Ehrhardt
Affiliation: ESO

HD 98800 is a hierarchical quadruple system. The subsystems A and B have a separation of ∼50au and the subcomponents of each exhibit ∼1au separations. While A has depleted its disk, B hosts a bright and compact disk in polar configuration wrt the binary plane. The gas presence, fractional luminosity and overall system age contribute to a debate on the evolutionary status of the disk. The A subsystem will soon pass behind the disk and act as back illumination of the B circumbinary disk offering the opportunity to study its gas and dust content via line spectroscopy in the optical (gas-tracer monitoring being carried out with UVES) and multi-band continuum emission monitoring in the submm/ cm domain (approved program with the VLA). We will present preliminary results on our polychromatic view of the system, from the characterization of the Ca II lines to the changes in the radio spectral indices.

2.19 Seeing Through the Dust: Biases in Disk Mass and Radius Measurements # Poster 19

Presenter: Vardan Elbakyan
Affiliation: University of Duisburg-Essen

Accurate dust masses and radii are crucial for planet-formation theory but are difficult to recover in the youngest systems. Using 3D hydrodynamic collapse simulations postprocessed with radiative transfer (RADMC-3D) and realistic ALMA observing simulations, synthetic Band-6 and Band-3 images were produced and analysed with standard observational recipes. These synthetic observational estimates were compared to the intrinsic masses and sizes from the models. The study shows that, with commonly adopted Ossenkopf & Henning opacities and Td≈20-40 K, Band-6 dust masses are underestimated by factors ?1.4-4.2, while Band-3 can both under- and overestimate masses (≈×2) depending on Td. Advanced dust growth (amax $\gtrsim$1 mm) drives the disk to optically thick regimes and can make reconciliation possible only with unrealistically low Td. Apparent disk radii are strongly affected by grain growth and beam smearing and can differ from intrinsic radii by up to a factor of two, motivating multi-wavelength constraints on maximum grain size.

2.20 What causes the dust's asymmetric emission in the inner parts of protoplanetary disks seen by the VLTI ? # Poster 20

Presenter: Simeo Evelain
Affiliation: Institut de Recherche en Astrophysique et Planetologie (IRAP)

Interferometric observations with the VLTI have revealed asymmetric near-infrared dust emission in the innermost regions of several protoplanetary disks, where planets are expected to form and migrate. In some cases, these asymmetries show temporal variability that cannot be explained by axisymmetric disk models. We investigate whether a vortex generated by the Rossby Wave Instability (RWI) could account for dust trapping and the resulting emission. We perform 2D and 3D hydrodynamical simulations with FARGO3D, modeling a transition between an inner turbulent region and an outer weakly turbulent region.

This transition can trigger vortex formation, and we show that the vortex lifetime can be extended in the presence of multiple planets. The simulations are post-processed with RADMC-3D to compute synthetic near-infrared emission maps, and interferometric observables are derived with ASPRO2. We discuss whether this scenario can reproduce the observed asymmetries in the inner disk of HD 163296.

2.21 The Circumbinary Disc of HD 34700A II. Analysis of a strong dust asymmetry # Poster 21

Presenter: Daniele Fasano
Affiliation: INAF - OAR

ALMA observations have shown many discs featuring large cavities and asymmetric rings in dust continuum, which might be associated with dust trapping mechanisms possibly caused by vortices.

We present new ALMA band 6 (1.3 mm) continuum images of HD 34700A, a binary system featuring a cavity, a ring, and multiple spiral arms detected in scattered light, a prominent crescent in the ALMA continuum and a complex gas morphology possibly connected with ongoing infall, and compare them with two other systems showcasing high contrast continuum asymmetries, IRS 48 and HD 142527.

With a combination of visibility, dust evolution and hydrodynamical models, we constrain the dust continuum emission morphology of HD 34700A for the first time, and improve existing models for IRS 48 and HD 142527. The high azimuthal contrast of the asymmetries confirms the dust trapping scenario, while the dust evolution models suggest that gas vortices are a plausible origin mechanism.

2.22 Joint Modeling of Multi-Resolution Continuum Data in Protoplanetary Disks # Poster 22

Presenter: Anna Fehr
Affiliation: Center for Astrophysics | Harvard & Smithsonian

Understanding the evolution of solids in protoplanetary disks is essential for modeling planet formation, but key dust properties (such as particle sizes, composition, and radial mass distribution) remain difficult to measure observationally. Thermal continuum emission at microwave frequencies provides a powerful probe of these properties. However, at the millimeter wavelengths commonly observed with ALMA, optical depth effects complicate interpretation. Observations at centimeter wavelengths have lower optical depths and can better constrain dust characteristics and column densities, but typically have coarser spatial resolution. We present a new method that jointly models datasets with different spatial resolutions, including disk-integrated spectra, enabling the combined analysis of high-resolution images with broad spectral coverage. Our approach can incorporate many grain parameters while mitigating degeneracies. We demonstrate that this method accurately recovers dust column densities, temperatures, and grain properties, and apply it to observations of HL Tau, CI Tau, and HD 163296.

2.23 Parameter Study of Dust Growth And Streaming Instability Onset In Wind-Driven Disks # Poster 23

Presenter: Olcay Ates Goksu
Affiliation: McMaster University

Protoplanetary disk (PPD) observations and simulations reveal turbulence to be weak, thereby supporting PPD evolution via MHD disk-winds. We use the disk evolution code DustPy to conduct a broad parameter study of dust evolution in PPDs, varying wind-driven and turbulent contributions to accretion rates, as well as disk-wind mass loss rates. The total accretion and mass loss rates are constrained within observational limits. We find that dominant wind-driven accretion results in maximum dust sizes up to two orders of magnitude greater than turbulent cases, due to the lack of turbulent stirring and efficient vertical settling. In the most extreme cases - the combination of high wind mass loss rates and strong wind-driven accretion - we find that the streaming instability threshold for planetesimal formation is exceeded near 1 AU to the star. This sets the stage for possible planetesimal and planet formation in this region without invoking pressure traps.

2.24 Kinematic evidence of gravitational instability # Poster 24

Presenter: Cassandra Hall
Affiliation: University of Georgia

The canonical core accretion theory of planet formation posits that planets grow slowly, beginning with particles of dust that grow to form planetesimals. An alternative planet formation theory proposes that planets can form instead from direct gravitational collapse of vast spiral arms, if the disc is gravitationally unstable. However, determining if gravitational instability (GI) occurs in observed discs has proved challenging, largely because of the difficulty in obtaining a measurement of the disc mass. In this talk, simulational work predicting the kinematic evidence of GI is discussed, and the kinematic detection of GI is reported.

2.25 Gas and dust evolution in disks around Very Low Mass Stars # Poster 25

Presenter: Tao Ji
Affiliation: University College London

Very low mass stars (VLMS, <0.2Msun) are the most abundant stellar population in the Milky Way and are prime hosts for terrestrial planets. The formation, architecture, and bulk composition of these planets are influenced by the properties of their natal disks. However, disks around VLMS remain poorly characterized. Using code DustPy, we will simulate dust evolution in disk around these very low mass stars from ALMA DMOST large program, a sample of 14 protoplanetary disks distributed equally between the star-forming regions of Taurus and Lupus. Pressure traps are incorporated by perturbing the gas surface density based on the continuum intensity profiles, and synthetic observations generated with RADMC-3D are compared to these profiles. We aim to get a deeper understanding of how efficient the drift and trapping is in the DMOST disks, constrain the turbulence and fragmentation velocity of dust particles, and calculate pebble fluxes to the inner disk. The latest will be compared to JWST observations of the sample (9/14 disks have MIRI data) to understand the role of drifting pebbles on the inner disk composition.

2.26 Following the footprints of warps: kinematics as a tracer # Poster 26

Presenter: Carolin (Lina) Kimmig
Affiliation: Universita degli Studi di Milano

Warped protoplanetary disks seem to be everywhere. A growing number of observations show hints of misaligned or warped structures, often revealed through shadows from an inclined inner disk region. To explain their origin, a wide range of mechanisms has been proposed, including misaligned binaries, stellar fly-bys, late infall events, and magnetic fields. As the warp shape depends on the formation and dynamical evolution of the warp, mapping its precise structure may help to distinguish different warp origins.

As shadows only provide limited constraints on the warp structure, we need to rely on a different method: Interpreting kinematic residuals as local changes in inclination and position angle of the observed disk regions enables us to extract the exact warp shape. I investigate this method from a theoretical point of view by creating synthetic observations of warped disks. In my talk, I present the possibilities and limitations of this kinematic method.

2.27 Scattering-Induced Biases in Dust Mass and Temperature Estimates of Protoplanetary Disks # Poster 27

Presenter: Naoya Kitade
Affiliation: National Astronomical Observatory of Japan

Dust mass and temperature in protoplanetary disks play crucial roles in determining their structure and evolution. Neglecting dust scattering in the interpretation of multi-wavelength millimeter observations can bias the inferred dust masses and temperatures of protoplanetary disks. In this study, we compute disk emission by numerically solving radiative transfer in a plane-parallel slab including dust absorption, emission, and scattering. We find that conventional approximations for optically thick disk emission are about 15% lower than our numerical solutions. This result suggests that previous studies may have systematically overestimated disk masses by up to a factor of two and disk temperatures by about 15%. We also present a new empirical formula that reproduces our numerical results and improves constraints on dust mass and temperature compared with conventional approaches. Furthermore, we discuss a new method to provide additional constraints on dust mass and temperature by combining polarization observations with continuum observations.

2.28 Contextualizing Circumstellar Disks in Close Young Binaries # Poster 28

Presenter: Taylor Kutra
Affiliation: University of Rochester

Multiplicity plays a key role in shaping the formation and evolution of circumstellar disks, and thus the initial conditions for planet formation. In this talk, I will share our analysis of four young multiple star systems with circumstellar disks between 4-5 AU: DP Tau, T Tau, ZZ Tau, and SR20. Comparing disk-disk and disk-orbit obliquities, we find that disks in close binaries (separations <40 AU) are preferentially aligned, whereas wider systems from the literature exhibit larger mutual obliquities. This trend supports viscous damping theory, in which disk alignment is rapid in tightly bound systems but increasingly inefficient at larger separations. Our results provide some of the highest-resolution measurements to date of disk geometry in young multiple systems and strengthen the link between stellar multiplicity, disk alignment, and the initial conditions of planet formation.

2.29 Collision velocities of dust grains in gravitationally unstable discs # Poster 29

Presenter: Cat Leedham
Affiliation: University of Cambridge

Young, massive protoplanetary discs are susceptible to gravitationally instability (GI), producing large spiral arms. Recent work suggests that dust grains are concentrated within spirals and can collapse to form bound objects of Earth mass sizes. However, for efficient dust concentration, grains must first grow to cm-sizes. It is currently unclear whether this growth is feasible within the dynamic conditions of GI discs.

I will present the results of 3D shearing box simulations of dust in gravitationally unstable discs. By measuring collision velocities between grains of different sizes, I estimate the maximum grain sizes that can grow without destructive collisions. These results place new constraints on whether dust can reach the sizes required for concentration in spiral arms, and therefore whether this dust-driven GI pathway for forming planetary cores is viable.

2.30 Near and mid-infrared study of the inner disk of the TTauri "dipper" star RY Lup with Optical Interferometry # Poster 30

Presenter: Mathis LETESSIER
Affiliation: Institut de planetologie et d'astrophysique de Grenoble (IPAG)

The remarkable diversity of exoplanets originates in the protoplanetary disks that surround young stars during their first few million years. Recent years have seen groundbreaking advances in our understanding of the structure and composition of these disks, driven by instruments like ALMA, VLT/SPHERE and the JWST. Yet, these powerful tools face a fundamental limitation: they cannot resolve the innermost regions of protoplanetary disks, a gap that near- and mid-infrared interferometry at the ESO/VLTI (Paranal, Chile) is uniquely positioned to fill.

In this work, we present high-resolution observations of the inner disk of the TTauri "Dipper" star RY Lup, obtained with the VLTI instruments MATISSE, GRAVITY, and PIONIER. These observations span a broad spectral range, from 1.6 to 12 μm, offering unprecedented insights into the disk's structure while placing constraints on the potential presence of companions. All model constraints are done with the oimodeler code developed by the JMMC.

2.31 Dust coagulation at water snowline of Protoplanetary disk # Poster 31

Presenter: Zhixuan Li
Affiliation: Department of Astronomy, Tsinghua University

The water snowline is critical to planet formation, because processes such as pebble traffic jams and retro-diffusion can significantly boost the dust-to-gas ratio, promoting planetesimal formation. Because the response to the influx of ice-rich pebbles at the sublimation front is complex, it is best studied through hydrodynamical simulations. Using such simulations, we recently identified a water trap that significantly enhances the ice density at the snowline. A limitation of these models is that the solid distribution is represented by a single pebble size, whereas in reality the small dust grains dominate sublimation and condensation. Moreover, the small dust grains determine the observational signatures probed by facilities such as JWST, because they populate the upper disk layers. Therefore, we have implemented a multi-component dust size distribution in our simulations. Using this approach, we quantitatively compare our new results with previous single-size treatments and identify observable tracers of snowline physics.

2.32 Identifying the Streaming Instability in Protoplanetary Disks from (Sub)millimeter Dust Polarization Following the Badminton Birdie-like Aerodynamic Alignment # Poster 32

Presenter: Zhe-Yu Daniel Lin
Affiliation: National Radio Astronomy Observatory

(Sub)millimeter dust polarization in protoplanetary disks has revealed the presence of large grains that are aligned along their long axis following the azimuthal direction of the disk. The novel Badminton Birdie-like Aerodynamic Alignment predicts large grains to align with their long axes following the direction of the gaseous aerodynamic flow experienced by the dust grain — the A-field. From 3D streaming instability (SI) simulations, I will show that the A-field is predominantly in the azimuthal direction in regions of high dust-to-gas ratio. Through polarized radiation transfer, the resulting polarization angle corresponds to the disk azimuthal direction, as observed in an increasing number of disks, especially at relatively long millimeter wavelengths. Therefore, the azimuthal dust polarization pattern offers evidence of ongoing streaming instability in protoplanetary disks.

2.33 Where are the dust rings? Dust evolution models of outer gas pressure bumps in exoALMA disks # Poster 33

Presenter: Lilian Luo
Affiliation: MSSL/UCL

ExoALMA observations revealed gas substructures beyond the millimetre continuum disk in several systems. We investigate whether these outer gas features should produce detectable dust structures at millimetre wavelengths. Using exoALMA miplane pressure-derivative profiles and chemically estimated gas masses, we reconstruct gas surface density profiles, then perform dust evolution modelling across a grid of turbulence and dust fragmentation parameters, post-processing the results to predict continuum emission across multiple ALMA bands. For many disks and parameter combinations, outer pressure bumps produce massive dust rings detectable in band 7, in tension with exoALMA continuum constraints. For two disks, we test a late introduction of the outer bump and enhanced outer-disk turbulence. We find that increasing turbulence in the outer disk can suppress the outer ring, and in certain cases, a combination of turbulence and fragmentation velocity allows a gas pressure bump to exist without a bright millimetre dust ring, though conclusions remain preliminary.

2.34 Misalignment and Dust Evolution in the Edge-on Flying Saucer Revealed by JWST # Poster 34

Presenter: Jie Ma
Affiliation: Institut de Planetologie et d'Astrophysique de Grenoble

Understanding the vertical structure of protoplanetary disks is essential for constraining dust evolution and disk dynamics. We present JWST NIRCam and MIRI imaging (1-21 μm) of the edge-on Flying Saucer (2MASS J16281370-2431391), combined with archival HST and ALMA data. The observations reveal a brightness ratio reversal between the two reflecting nebulae at near-infrared, explained by a modest misalignment between the inner and outer disk. JWST also uncovers, for the first time, a curved lining feature along the disk edge at 2μm, consistent with enhanced forward scattering near the ?≈1 surface. Using 3D radiative transfer modelling, we demonstrate that a misaligned geometry with dust settling and grain growth reproduces the observed morphology across wavelengths within a unified framework. Placing the Flying Saucer in context with other edge-on disks, we show that such systems provide powerful constraints on disk geometry and dust evolution.

2.35 Modeling the curved dust sublimation front in protoplanetary disks: a potential probe of midplane turbulence # Poster 35

Presenter: Ezequiel Manzo-Martinez
Affiliation: Instituto de Astronomia-UNAM/University of Michigan

We present a new approach to determine the geometry and emission of the dust sublimation inner wall in T Tauri stars, which adopts a density-dependent sublimation temperature for the dust. We show the spectral energy distributions for disk models with curved walls, varying the mass accretion rate, the dust settling, inclination, and the height of the midplane layer with mm grains. We compare synthetic near-IR colors to observed colors from T Tauri stars in Taurus, IC 348, and Orion. Most observed colors are reproduced within expected parameter ranges, but matching the most densely populated regions requires millimeter-sized grains to reach 0.5-3 scale heights above the midplane. This result suggests there is a mechanism, likely turbulence, capable of lifting large grains toward the upper disk layers. These findings provide, for the first time, insight into the dynamical conditions in the midplane, near the star.

2.36 Trapper keepers: Measuring the efficiency of disk solid retention against radial drift # Poster 36

Presenter: Melissa McClure
Affiliation: Leiden Observatory

Rocky planet compositions are thought to depend on disk structures that may trap radially drifting dust, preventing both accretion of planetary building blocks onto the central star and re-supply of volatile solids from the outer disk to the inner disk. Models predict various trapping efficiencies depending on the disk and gap properties. However, there are few observational measurements of trapping efficiencies. I show empirically that the 8 Myr old TW Hya's 3+ ring system cumulatively traps ∼99% of the radially drifting carbon solids entering the 1 AU region, while the ring within 1 AU traps drifting refractory solids by an additional factor of 100. A similar depletion factor of Si/C is also found in the jet of a young Class I protostar, HOPS 315, suggesting rocky solid trapping. This may point to a common inner disk mechanism stopping the drift of rocky grains, already from early ages.

2.37 Gravitationally unstable discs delay the radial drift of dust # Poster 37

Presenter: Farzana Meru
Affiliation: University of Warwick

We perform 2D simulations of dust and gas to understand the long-term evolution of dust in gravitationally unstable discs. We find that dust quickly drifts towards the spirals as previously shown. They then move inwards along the spirals into the inner disc. However, the timescale on which they move inwards is significantly longer than the analytical radial drift timescales. We find that the self-gravitating turbulence causes islands of pressure maxima to form along the spirals which help to prevent dust from drifting inwards. This effect is most significant for moderate levels of turbulence. High turbulence causes these islands to be washed out more easily, although dust is still retained in the disc longer than analytically expected. We conclude that self-gravitating discs can help to retain solids in the disc, which can ultimately aid planet formation.

2.38 Two precessing annuli produce broad shadows in protoplanetary discs: observations and modelling of HD 139614 # Poster 38

Presenter: Katie Milsom
Affiliation: University of Exeter

In this poster we present scattered light observations of the protoplanetary disc HD 139614 taken with both GPI and SPHERE instruments. The main features of the disc include an azimuthally asymmetric bright ring (at 13-21 au), two potentially spiral arcs (at 31-44 au and 44-57 au), and a broad shadow across $\sim 2/3$ of the outer disc. We show that the azimuthal surface brightness distribution of the bright ring changes with time and constrain the period of this variability to be $<$11 months. We produce a physical model to explain the broad shadow and azimuthally asymmetric bright ring using 1D warp theory coupled with a fast radiative transfer code to produce scattered light images. The model consists of three annuli separated by gaps and an inclined planet between the inner two annuli. The planet perturbs the inner two annuli causing them to tilt and precess casting shadows on the outer annulus. These shadows combine to reproduce the broad shadow and asymmetric bright ring seen in observations of HD 139614. The precession of the annuli is periodic, so the model reproduces the observations at multiple times, with long precession periods (8.3 x 10^3 and 7.5 x 10^4 years for the inner and middle annuli respectively), so the shadows appear stationary over observational time periods.

2.39 Global, Time-Dependent, 2D Simulations of Gas+Dust Evolution in the Inner Disc # Poster 39

Presenter: Subhanjoy Mohanty
Affiliation: Imperial College London

Understanding the origin of super-Earths and sub-Neptunes demands detailed models of the inner protoplanetary disc, where these planets are ultimately found. Here, the turbulence, thermal and non-thermal effects, and dust and gas evolution all interact to govern the conditions for planet formation and migration.

We present the first global, time-dependent 2D (R-z) simulations of the inner disc, that self-consistently couple gas-dust dynamics, MRI-driven viscosity, radiative transfer, a chemical network with grain charging, and grain coagulation and fragmentation.

Our key results are: (i) the first demonstration of secular instability in the inner disc with realistic ionisation chemistry, MHD, and dust evolution; (ii) the timescales on which these instabilities develop and survive; and (iii) the critical role of grain charging in shaping dust behaviour in the inner disc. We discuss the implications for inner-disc planet formation.

2.40 Dust and water in V883 Ori: Relics of a retreating snowline # Poster 40

Presenter: Chris Ormel
Affiliation: Tsinghua University

883 Ori is an FU-Orionis-type outburst system whose ALMA Band 6 and 7 continuum images reveal a distinct shoulder in emission at 50-70 au. This feature was previously attributed to pile-up of solids caused by the H2O iceline. However, extended water emission is detected beyond 80 au, implying a snowline located farther out. Here, we explain these observations with a model where the snowline in V883 Ori is retreating, in sync with the gradual dimming of the system. The shoulder arises from excess surface density produced by vapor recondensation at the inward-moving condensation front, while the outer water vapor reservoir persists due to long recondensation timescales ($\sim$100-1,000 yr) in the disk atmosphere. As V883 Ori continues to fade, we predict that the intensity shoulder will migrate inward by an observationally significant $\sim$10 au over the next $\sim$35 years.

2.41 Extending dynamical mass measurements: probing GI as a possible origin of mm-dust spirals # Poster 41

Presenter: Viviana Pezzotta
Affiliation: University of Milan

Accurately constraining protoplanetary disc masses is crucial to determine the availability of material for planet formation, yet challenging. Gas kinematics provide a powerful, tracer-independent method to precisely characterise disc masses. By fitting the velocity rotation curves of different molecular tracers with an accurate model including disc thermal stratification and self-gravity, we constrain the stellar masses, disc masses, and scale radii for the discs around HD97048 and WaOph6. We extend the dynamical method to analyse embedded sources exhibiting features of absorption, and we correct for observational biases, including beam smearing. We comprehensively estimate the systematic uncertainties on the best-fit parameters by bootstrapping over the retrieved disc geometries and 2D thermal structures. Finally, we investigate the connection between disc stability and the appearance of spiral morphologies in the mm-continuum emission, comparing the Toomre parameter of all dynamically weighed discs, demonstrating that discs with mm-dust spirals have systematically lower Q values.

2.42 Kinematics Signatures of Stellar Flybys in Protoplanetary Discs # Poster 42

Presenter: Vasundhara Prasad
Affiliation: Institute of Astronomy, University of Cambridge

Recent work by the exoALMA collaboration suggests that many of the kinematic structures observed in young protoplanetary discs can be attributed to warps in the discs. In this talk, I will present the results of three-dynamical smoothed particle hydrodynamics (SPH) simulations of protoplanetary discs perturbed by inclined stellar flybys. I will demonstrate that kinematic features in the gas disc persist for much longer timescales than perturbations in the gas density of the disc. I will then show the results of fitting synethic observations of flyby-perturbed discs to smooth Keplerian models, focusing particularly on the residual velocity features in the gas disc. Finally, I will demonstrate that substructures induced in a protoplanetary disc by a stellar flyby, most notably spirals, can be erroneously interpreted as signatures of a geometric warp in the disc.

2.43 Photospheres and Inner Disks at 5-10 Myr: MRS observations of Upper Sco disks # Poster 43

Presenter: Colette Salyk
Affiliation: Vassar College

JWST's MIRI-MRS has proven to be a powerhouse for studying protoplanetary disk chemistry and its connections to planet formation. Interestingly, for cooler and/or more evolved young stars with disks, the star itself can make a substantial contribution to the flux at the shortest ($<\sim$7 micron) MRS wavelengths, and the disk material can become optically thin. Therefore, MRS observations of such systems present a unique opportunity to study stellar photospheres, as well as to study the evolution of inner disk gas and dust content during disk dissipation. I will present analysis of short wavelength portions of MRS spectra for a sample of 10 disks located in Upper Sco, with ages of 5-10 Myr. I will discuss lessons learned from the Upper Sco sample about stellar photospheres and inner disk dissipation at ages of 5-10 Myr.

2.44 Dust Clumping in Protoplanetary Discs # Poster 44

Presenter: Maria Semerkina
Affiliation: Imperial College London

Dust within protoplanetary discs is an important component of models and understanding the properties and dynamics of dust within discs will help further our understanding of planet formation processes. However, even as dust is an essential component within discs, modelling dust opacities, grain sizes and interactions remains a large uncertainty in models. The underlying reason behind smaller spectral indices of discs is still unexplained. Models have explored whether dust dynamics with particle size growth or the concentration of small particles creating optically thick regions could explain the inconsistencies in observed data. In both cases it was found that these methods on their own could not explain all the inconsistencies in the observational data. A model with dust growth coupled with radiative transfer calculations has the possibility of explaining the inconsistencies in disk masses, grain sizes and disk luminosity. I will discuss my work addressing this problem in my poster.

2.45 pinball-rt: Radiative Transfer at Warp Speed # Poster 45

Presenter: Patrick Sheehan
Affiliation: NRAO

Monte Carlo radiative transfer is tool that is commonly used to study protoplanetary disk structure and evolution, but it can also be limited by the significant computational cost to running models. In this poster, I will present a new Monte Carlo radiative transfer modeling code that can dramatically speed up radiative transfer calculations by (1) running on GPUs to exploit the embarrassingly-parallel nature of the algorithm, and (2) by leveraging machine learning techniques to speed up the propagation of photons through optically thick cells. The code is written in pure Python, making it very accessible for both scientific use but also for anyone interested in algorithm development and/or incorporating machine learning into radiative transfer. I present it here in hopes that the community will find it useful for their science.

2.46 Neural Differential Equations for Dust Coagulation in Hydrodynamical Simulations # Poster 46

Presenter: Benjamin Silk
Affiliation: TU Delft

The state of the art in coupling dust coagulation to hydrodynamical simulations of protoplanetary disks are 2D simulations with $\sim$100 particle size bins. Many problems in planet formation, such as the streaming instability, are 3D in nature and require extremely high resolution in size space. Coupling 3D hydrodynamics with coagulation requires going beyond the current state of the art, by harnessing the power of machine learning (specifically neural differential equations) to obtain an efficient and accurate subgrid model for dust collisions. This will for the first time allow for a full treatment of the dust component, including coagulation, in simulations of the polydisperse streaming instability and pebble accretion.

2.47 A census of Herbig disk masses # Poster 47

Presenter: Lucas Stapper
Affiliation: Max Planck Insitute for Astronomy

Over the past decade, numerous population studies have been carried out with the Atacama Large Millimeter/submillimeter Array (ALMA) to investigate the fundamental properties of protoplanetary disks around young stars, which focused primarily on low-mass stars. In this talk I will present new millimeter interferometric data of a sample of 250 Herbig stars, the formation site of giant exoplanets, and obtain their dust masses. We find clear differences in the distribution of dust masses between Herbig disks and disks around lower mass stars. We find a bimodal disk mass distribution likely as a result of dust evolution. Furthermore, the occurrence rate of the most massive disks coincides with the occurrence rate of giant-planet formation, which are likely related. Lastly, we discuss the completeness of the sample and find that we are missing a large fraction of the pre-main sequence intermediate mass star population and efforts should be made in identifying them.

2.48 Comparing high-contrast imaging analysis techniques in retrieving fine structures in total intensity disc observations # Poster 48

Presenter: Sophia Stasevic
Affiliation: Observatoire de Lyon - CRAL

The detection of disc structures offers insight into the formation and evolution of planetesimals - and, possibly, planets - in a system. However, even with state-of-the-art instruments, resolving these structures remains a challenge in high-contrast imaging data. While reference-star differential imaging (RDI) is historically used to overcome the limitations of self-subtraction in total intensity reductions, inverse problem approaches using multispectral data allow us to retrieve deconvolved disc structures while removing stellar artefacts from the data. I quantify the efficiency of this technique in retrieving disc parameters, compared to RDI reductions using multi-year reference libraries or star-hopping. I also focus on multi-epoch observations of protoplanetary discs in order to show the evolution of fine structures - such as shadows, blobs, and spirals - which we are able to retrieve with deconvolution.

2.49 Can Simulation-Based Inference Reshape the Search for Structured Protostellar Discs? # Poster 49

Presenter: Callista Sullivan
Affiliation: Queen's University

ALMA has accumulated thousands of protostellar disc observations, but identifying structure such as gaps or rings from visibility data often requires several hours of modeling per disc. My work aims to reduce this prohibitive requirement by creating a neural network that can quickly identify a disc's structure using Simulation-Based Inference.

In this presentation, I will highlight initial steps in building and testing this neural network. Once preliminary testing is complete, it will be trained on tens of thousands of simplified geometric disc models alongside observations that contain pre-identified disc structure. After training, it will be validated against a different suite of pre-analysed discs and geometric models. When complete, this neural network will require only a few minutes to identify structure in discs and will thus shift the current paradigm from analysing individual discs to analysing the presence, form, and statistics of structure among large disc populations.

2.50 High-resolution ALMA imaging of the externally perturbed disk, WW Cha # Poster 50

Presenter: Joseph Tang
Affiliation: Columbia University

The protoplanetary disk WW Cha has been of interest for its large-scale streamer structure and one-armed spiral seen in previously published infrared scattered-light imaging. This streamer funnels supplemental material to the disk and perturbs its angular momentum. Here I present the 0.03", high-resolution ALMA millimeter continuum image which resolves two annular gaps in the disk. Assuming these gaps are carved out by planets, we estimate masses of 0.33 M_J and 0.22 M_J for the inner and outer gaps, respectively, using DBNets 2.0. The high-resolution image also reveals a ∼4AU central cavity that is slightly offset from the surrounding rings and gaps, consistent with interactions within the central binary. Additionally, after modelling and subtracting an axisymmetric disk with Protomidpy, this disk shows a one-armed spiral in the midplane. In my poster, I will discuss various spiral formation processes, such as late-infall, planet-disk interactions, and gravitational instability.

2.51 Streamers impact on protoplanetary disks # Poster 51

Presenter: Maxime Tanious
Affiliation: ICE-CSIC

Streamers are newly identified structures that transport material from large molecular clouds to protoplanetary disks and are observed at all stages of star formation. Despite their prevalence, their influence on disk evolution remains poorly understood. I will present a study of a Class I protostellar system investigating the physical and chemical properties of a streamer and its connection to the disk. Using NOEMA and the IRAM-30m observations, we detected a new streamer channeling material from a prestellar core to the disk. Radiative transfer analysis reveals that the streamer is several times more massive than the current disk and is likely responsible for its external warp. Additionally, the streamer retains a chemical footprint from the prestellar core, which will eventually be incorporated into the disk. These findings emphasize the crucial role of streamers in disk evolution.

2.52 Dust Dynamics in Disk Pressure Bumps and Late Planetesimal Formation # Poster 52

Presenter: Maya Tatarelli
Affiliation: Observatoire de la Cote d'Azur

Pressure bumps in protoplanetary disks are widely invoked to explain ring structures observed by ALMA and are often considered possible sites of planetesimal formation. Using 3D dust-gas simulations, we investigate how dust concentration and back-reaction shape the structure and evolution of disks containing pressure maxima. In inviscid disks, dust trapping produces rings composed of two closely spaced sub-rings located at η-reversal points. At typical observational resolution these would appear as a single broad ring, suggesting that observed ring widths may arise from unresolved substructure rather than turbulent diffusion. The formation of these sub-rings also limits radial contraction of the dust, preventing indefinite increase in dust density. When dust is continuously supplied, dust back-reaction erodes the pressure bump and generates multiple rings, further limiting dust concentration. These results suggest trapping alone may not lead to planetesimal formation, which instead becomes favored at later stages when gas loss increases the dust-to-gas ratio.

2.53 Accuracy improvements for accretion disc magnetic fields using smoothed particle magnetohydrodynamics # Poster 53

Presenter: Terrence Tricco
Affiliation: Memorial University of Newfoundland

Smoothed particle hydrodynamics (SPH) has many desirable properties for the study of accretion and protoplanetary discs, such as conservation of angular momentum and energy and robust solvers for gas-dust dynamics. One under-explored area is magnetic fields in discs using smoothed particle magnetohydrodynamics (SPMHD). In this talk, we focus on the performance of SPMHD in correctly evolving turbulence induced from the magneto-rotational instability (MRI) in global disc simulations. We will show that current formulations, such as those used in the Phantom code, incur excessive resolution requirements to activate the MRI and correctly evolve MRI-induced turbulence. We will discuss the origins of this issue, and provide simple, computationally inexpensive changes to the numerical scheme that overcome it.

2.54 Observational constraints on dust concentration and planetesimal formation in protoplanetary disks # Poster 54

Presenter: Marion Villenave
Affiliation: IPAG, Univ. Grenoble Alpes, CNRS

To form giant planets during protoplanetary disk lifetime, small micron sized particles must grow rapidly to larger grains. Characterizing the radial and vertical structure of these gas-rich disks around young stars is crucial for understanding this process. More specifically, important vertical concentration of solids, allowed by efficient vertical settling, is particularly favorable for efficient planet formation and growth. This presentation will discuss recent results constraining vertical dust concentration as a fonction of radius in protoplanetary disks. While vertical settling is typically efficient in the outer disk, some systems display intermediate regions ($<$ half the disk radius) with reduced settling efficiency, making these area less conducive to efficient planet formation. This suggests that planet formation might be more efficient at large orbital distances from the star, challenging our current understanding of the mechanisms at play.

2.55 The Fast & Fourier: No More Waiting for Radiative Transfer # Poster 55

Presenter: Lukas Welzel
Affiliation: Leiden Observatory

Edge-on protoplanetary disks provide a natural laboratory for measuring the composition and vertical distribution of the icy building blocks of planets. Interpreting observations requires linking disk structure, grain properties, and dust settling to observables through radiative transfer (RT) and ray-tracing models.

However, the runtime of RT models makes systematic analysis of the growing sample of edge-on disks impractical.

We present a neural emulator that is ∼10^6x faster at producing RT spectra of highly inclined disks across a broad range of disk geometries, grain properties, and stellar parameters. Using broadband photometry, we infer the parameters of ESO-Ha 569 and HH 48 NE. Our results agree with previous photometric and imaging studies of these disks. We then apply our method to JWST targets, enabling for the first time a fast, homogenous, and well calibrated way to infer the properties of a large sample of edge-on disks.

2.56 A Millimeter Survey for Disks around Herbig Be Stars # Poster 56

Presenter: David Wilner
Affiliation: Center for Astrophysics | Harvard & Smithsonian

Giant planet occurrence increases with stellar mass and metallicity, in line with core accretion. However, a peak is found near 2 solar masses, possibly because disks around higher mass stars are dispersed too quickly to form planets. The disks around the higher mass Herbig Be stars have received little attention, though, in part because they are intrinsically rare and typically far away. We present an SMA survey of the 24 accessible Herbig Be stars within 3 kpc from the sample of Vioque et al. 2022, detecting 5 Herbig Be stars at 1.3 mm and at 0.87 mm (including 2 above 10 solar masses). The detected emission is consistent with the disk scaling relation between millimeter luminosity and stellar host mass for low-mass stars. The implied disk masses are sufficient for giant planet formation. There is no clear decrease in the detection fraction with stellar host mass.

2.57 Icy Volatile Enhancements in Evolving Protoplanetary Disks: The Role of Entrapment # Poster 57

Presenter: Elizabeth Yunerman
Affiliation: Center for Astrophysics | Harvard & Smithsonian

Molecular species in disk models with viscous diffusion, advection, drift, desorption, and adsorption become enhanced and depleted in gases and solids, redistributing formation materials. In our model, before ∼0.5 Myr, outer disk volatile ices are relatively enhanced to H2O as drift desiccates it, while after, outward advection and volatile deposition boost enhancements following the evolving critical disk radius. These results, however, presume that ice species are isolated, while in reality laboratory experiments demonstrate that volatiles are entrapped in less volatile ices. We therefore incorporate new laboratory entrapment data into our model, considering carbon and nitrogen species within multi-component H2O- and CO2-dominant ice matrices, to explore the role of entrapment in dynamical disk redistribution. Entrapment can impact final icy volatile relative enhancements, particularly those of mid- and inner-disk species as compared to hypervolatiles, as subtle changes in laboratory ice mixing ratios translates to different molecular redistribution during the disk lifetime.

2.58 Measurements, simulations and characterization of protoplanetary dust analogs scattering properties # Poster 58

Presenter: Remi ZERNA
Affiliation: Institut de planetologie et d'astrophysique de Grenoble

The morphology and composition of dust grains in protoplanetary disks (PPDs) strongly influence both the early stages of planet formation and how starlight is scattered and polarized at micrometer or millimeter wavelengths. Constraining these scattering properties is therefore crucial to trace grain growth and disk evolution accurately.

In our work, we investigate the scattering behavior of complex dust analogs through laboratory measurements and numerical simulations. Microwave-analogy experiments on 3D-printed particles with controlled shapes and compositions exploit the scale invariance rule of Maxwell's equations to derive scattering phase functions and polarization patterns. Our results on Solar System analogs indicate that millimeter-sized chondrule-like particles could reproduce polarization signatures observed with ALMA. Complementary Discrete Dipole Approximation (DDA) simulations extend this analysis to aggregates composed of silicates and amorphous carbon, revealing the influence of composition and morphology. Together, these approaches link laboratory analogs, numerical models, and observations to better characterize dust in PPDs.

3 Disc chemistry

3.1 Searching for Inner Disk Pebble Drift with JWST Spectra of HD 163296 # Poster 1

Presenter: Tayt Armitage
Affiliation: University of Wisconsin-Madison

The molecular inventories of the inner disk region around Herbig stars have notably been difficult to constrain due to limited sensitivity and the high infra-red luminosities of the dust disk. However, with the improved resolution from JWST MIRI/MRS we have robustly detected water and OH lines within the protoplanetary disk around the Herbig Ae star HD 163296. Using detailed slab models we identify two emitting temperature components for each molecule: warm and cool H2O, along with warm and cool OH. The cool water constraint is of particular importance as it can place constraints on the pebble flux through the water snowline ($\sim$7 au). Already, modeling of CO observations has determined the outer 60 au of this disk has experienced significant pebble drift. From our best-fit model we have calculated the necessary pebble flux through the water snowline to match the observed inner disk cool water mass.

3.2 Impact of accretion variability on the CO emission of a disk around a very-low-mass star with JWST # Poster 2

Presenter: Camille Bergez-Casalou
Affiliation: Institut d'Astrophysique Spatiale

Recent JWST/MIRI observations of disks around very-low-mass stars (VLMS) tend to show that these disks are richer in hydrocarbons compared to their TTauri homologs. In order to more precisely derive the disk C/O ratio, we obtained NIRSpec observations (1 to 5 microns, with CO emitting around 4.6 microns) of a VLMS which has been already characterized with MIRI. We find that this target actually presents an accretion variability and it is consistent with a reduction of its accretion rate of at least a factor 5 in 2 years. This variability impacts the emission of CO in the inner disk, reducing its total flux by a factor 2. I will present these new observations and discuss how the CO correlates with the gas reservoir in the inner regions of these disks.

3.3 The molecular composition of the dust depleted inner disk # Poster 3

Presenter: Jelke Bethlehem
Affiliation: Max Planck for extraterrestial physics

The molecular composition inside the dust-sublimation zones of protoplanetary disks is mostly unknown, but important to our understanding of terrestrial planet formation. A few molecules have been observed from this region, specifically CO, H2O, OH, and SiO. Using 2 models including both thermochemical and hydrodynamical aspects we investigated the dust depleted hot dense gas of disks. We predict that the gas density in the dust-depleted inner disk is high enough to allow for H2 formation, resulting in a molecularly rich environment. We will show which molecular species we expect to be present in the dust free part of a disk and how the chemistry of these species proceeds in the absence of dust. Using our model we create a 3D cube which we use to create synthetic observations for GRAVITY.

3.4 Chemistry of Gravitational Instability Planets # Poster 4

Presenter: George Blaylock-Squibbs
Affiliation: University of Lancashire

In this talk I will present preliminary results showing how planets that form via gravitational instabilities can have different initial chemical abundances, even within the same disc. The dynamic evolution of protoplanetary discs is modelled using smoothed-particle hydrodynamics, and the chemical evolution of the disc is performed as a post process using an established chemical network. The results show that the abundances can be affected by the degree of gravitational instability that is present within the discs. I will also give a brief look at the next part of the project. The next stage of this work is to follow the chemistry to higher densities, to the second hydrostatic core during planet formation. The final aim of the project is to produce a catalogue of chemical species that are enhanced for planets that form via gravitational instabilities, giving us observational tests of our models.

3.5 Characterizing the Chemical Landscape of Giant Planet Formation # Poster 5

Presenter: Alice Booth
Affiliation: Center for Astrophysics, Harvard and Smithsonian

Planetary systems form from the dust, gas, and ice in protoplanetary disks, making disk chemistry studies essential for understanding exoplanet compositions. In this talk, I will present a high-sensitivity molecular line survey with the Atacama Large Millimeter/submillimeter Array (ALMA) of disks around ∼1.5-2.5 M? stars. These more massive stars and disks are particularly favorable sites for giant-planet formation, so the chemical environment is especially relevant. The observations reveal significant chemical diversity across disks, producing varying C/O ratios at the orbital radii of candidate protoplanets, along with abundant volatile sulfur and complex organics. When comparing these disk C/O ratios with those measured for directly imaged exoplanets, we find substantial overlap, indicating that low-C/O gas is common on tens-of-au scales. These results demonstrate that the chemical makeup of disks plays a crucial role in setting the initial conditions for planet formation and the eventual composition of exoplanets.

3.6 How Dust Dynamics and Chemistry Shape the Water Reservoir # Poster 6

Presenter: Jenny Calahan
Affiliation: Harvard University

Within a planet-forming disk, the water reservoir informs the process of planet formation, and sets the inheritance of this critical ingredient for life on terrestrial planets. The delivery of volatile molecules through the drifting dust population is thought to be the driving mechanism behind the enhancement of cold water seen in compact disks. To understand how the water reservoir within a planet-forming disk evolves over time, we have combined dust evolution and thermo-chemical tools. We utilize a 1D dust evolution model that takes into account dust growth, drift, and delivery of water into the inner disk. We take those results, and use this as an initial condition for a thermo-chemical calculation of gas temperature and final water distribution. We find that the thermo-chemical framework alters the abundance and distribution of the water, also altering the snow surface over time.

3.7 First constraints on elemental abundances in inner TTauri disks from thermochemical models # Poster 7

Presenter: Pacome Esteve
Affiliation: Insitut d'Astrophysique Spatiale, Universite Paris-Saclay

The determination of elemental abundances in inner disks represents a challenge for the disk community to interpret the composition of planetary atmospheres. JWST is now revolutionizing the field, but robust constraints on the gas still require forward models. In this contribution, we present new thermochemical models designed to put the first constraints on the C/O ratio in inner disks. With a refined carbon chemistry and new treatment of photodissociation, we match the C2H2 and H2O fluxes with a model grid varying dust properties and elemental abundances. We will show that the C2H2/H2O flux ratio is not only sensitive to the C/O ratio, but also to the O/H ratio since oxygen is the main destruction pathway of hydrocarbons. A first comparison with JWST data indicates that C/O $>$ 1 is excluded in TTauri disks, a result that we will discuss in light of radial transport models.

3.8 Study of the vertical and radial structure of edge-on protoplanetary disks # Poster 8

Presenter: Coralie Foucher
Affiliation: Laboratoire d'Astrophysique de Bordeaux

Understanding how complex molecules evolve in planet-forming environments is essential for tracing the origins of life. Protoplanetary disks are key sites for this chemistry, and edge-on systems provide a unique opportunity to study their vertical structure. We analyze the structure of an edge-on disk using ALMA archival observations of CO isotopologues, N_2H+ , DCO+ , H_2CO, and the continuum, combined with NOEMA data on HCO+ , HCN, CS and C_2H. Using a tomographic approach together with a parametric radiative transfer model, we derive radial and vertical profiles of gas and dust temperature and density. We reveal clear molecular stratification, with a well-defined molecular layer and species showing more extended emission, likely influenced by a disk wind. These results demonstrate the power of molecular tomography in constraining the vertical thermal and chemical structure of protoplanetary disks and refining thermo-chemical models of planet-forming environments.

3.9 CO2 and its isotopologues: can we trace inner disk enhancement due to drifting ices? # Poster 9

Presenter: Danny Gasman
Affiliation: MPIA

The enhancement of H2O in the inner disk due to drifting icy pebbles is currently a hot topic. However, dust may not only bring in water-ice, but other ice species as well. In fact, trapping of ices in water-ice may prevent specific species from sublimating at their own snowline. This may have implications for the formation and composition of terrestrial planets. The CO2 snowline is relatively close-in too, and we may be able to trace CO2 sublimation using JWST-MIRI. While 12CO2 tends to be optically thick, with the sensitivity of MIRI we can now also characterise its isotopologues. Using relative emission from CO2 isotopologues and the shapes of their Q-branches in MIRI spectra, I attempt to probe drift-related enhancements.

3.10 Disc chemistry across star-forming regions from molecular column densities # Poster 10

Presenter: Natalie Green
Affiliation: UC Berkeley

While initial studies have provided hints about the chemical, physical, and dynamical drivers of disc chemistry, as well as the distribution of organic volatiles, a major limitation is the small and biased samples observed to date. In this work, we calculate disc-integrated column densities and upper limits for all molecules observed as part of the ALMA Disk-Exoplanet C/Onnection (DECO) Large Program. Unlike synthetic line fluxes, column densities can be calculated with minimal assumptions about the disc properties and geometry. Our focus is therefore to leverage the large data set from DECO to move beyond pairwise correlations between the chemistry and disc/stellar properties.

3.11 Understanding Ice Transport Processes in the Externally Photoevaporated Protoplanetary Disc XUE 10 # Poster 11

Presenter: Jude Hammond
Affiliation: University of Exeter

External photoevaporation of protoplanetary discs from their environment can dramatically influence their dynamical and chemical evolution. The externally-photoevaporated disc XUE 10 has been observed by JWST and inferred to have CO2/H2O column density ratios of $\sim$130, far higher than any previous observation or dynamical model predicts. We use the state-of-the-art 1D viscously evolving disc model TriPoD, coupled with compositional tracking and substructures, to explore the evolution of such a disc. We show whether or not it is possible to achieve CO2/H2O column densities of 130 using dynamics alone, or if additional physics and/or chemistry is required. We also explore dust size distributions in this disc, and show how the disc composition inside the water snowline (r $<$ 20 au for XUE 10) changes due to the presence of rings and gaps.

3.12 The ALMA Disk-Exoplanet C/Onnection (DECO): A statistical study of H2CO in T Tauri protoplanetary disks # Poster 12

Presenter: Claudio Hernandez-Vera
Affiliation: European Southern Observatory

Formaldehyde (H2CO), a precursor to more complex organic species, can potentially trace the elusive O-rich organic inventory frozen in protoplanetary disks. However, whether this extends to the broader population of disks remains unclear due to the limited number of existing studies. Within the context of the DECO ALMA Large Program, we report new detections of H2CO in 44 disks, with most showing column densities and rotational temperatures consistent with cold formation pathways for H2CO. Still, in some cases, a warmer chemistry may also be possible due to disk-environment interactions or for more massive sources. While we do not find significant differences among disks in different star-forming regions, our results suggest correlations between H2CO properties and disk/stellar parameters, as well as with the C/O ratio, reflecting chemical differences across the sample. Future efforts will be key to disentangling how H2CO chemistry vary specifically from disk to disk.

3.13 HDCO detection and D/H ratio in edge-on Class II protoplanetary disks # Poster 13

Presenter: Cora Hoppe
Affiliation: IPAG

Deuterium fractionation is commonly used to trace chemical inheritance during planet formation. We extend this approach to protoplanetary disks and test whether high D/H ratios can survive through the Class II stage, thereby constraining the efficiency of chemical reprocessing during disk evolution. To do so, we investigated the D/H ratio in nine edge-on Class II disks as part of the DiskStrat ALMA Large Program, using HDCO and DCN. HDCO is detected for the first time in Class II disks. We show that HDCO is a powerful tracer of prestellar chemical inheritance and can also reveal disk substructures such as winds, inflows, gaps, and rings. Across the sample, we derive high D/H ratios of about 0.1, showing that strong deuterium enrichment can persist well into the protoplanetary disk phase. These results challenge efficient chemical resetting scenarios and support the survival of inherited material up to planet formation.

3.14 How leaky? Revising the impact of outer dust traps on the composition of the inner protoplanetary disc in the context of JWST # Poster 14

Presenter: Adrien Houge
Affiliation: University of Copenhagen

To understand the properties of terrestrial planets and make sense of the chemical diversity measured with JWST, it is of great importance to model precisely the inward radial drift of icy pebbles, which transports large amounts of volatiles from the outer to the inner disc. Though this process is well understood in smooth protoplanetary discs, most observed discs tend to exhibit axis-symmetric gaps and dust traps, in which case the radial transport of pebbles is more complex. In this talk, I will discuss how we used the state-of-the-art dust evolution code DustPy to quantify the leakiness of dust traps created by a giant planet and map out the different leakiness regimes, thanks to an unprecedented parameter space exploration. I will then discuss the consequences of our findings on our knowledge of the inner disc composition and JWST observations (O-rich chemistry, C/O ratio).

3.15 Bridging the Gap: Vertical Chemical Structure in Protoplanetary Discs # Poster 15

Presenter: Zuzanna Jonczyk
Affiliation: University of Leeds

Observations of protoplanetary discs primarily probe their warm, irradiated surface layers, leaving the cold midplane, where planets form, largely inaccessible. How surface layer chemistry relates to the hidden midplane inventory remains a key open question. Here, we investigate the vertical chemical connection using 1D cuDisc models with full gas-grain chemical networks, radiative processing, and turbulent transport. By resolving the vertical structure across disc radii, we explore how photochemistry, ion-molecule reactions, and grain surface processes in the surface layers feed material downward through diffusion and mixing. The simulations track the formation, destruction, and redistribution of volatile species and complex organics, quantifying how surface molecules influence midplane ice compositions. Our results identify chemical tracers sensitive to vertical transport and provide a framework linking observable surface chemistry to midplane environments that set the initial conditions for planet formation.

3.16 Inside the water snowline: Connecting disk evolution to JWST spectra # Poster 16

Presenter: Till Kaeufer
Affiliation: University of Exeter

The JWST/MIRI observations probe the gas content in the inner regions of protoplanetary disks. The interpretation of MIRI spectra is a highly debated topic. Observed excess cold-water emission in compact discs has been linked to drift and sublimation of icy pebbles. If confirmed this puts important constraints on disk evolution and planet formation.

However, dynamics in the inner disk are complicated by the interplay between pebbles delivering volatiles, gas dynamics, and local chemistry. To disentangle these processes, we present a new 2D dynamical disk model that finds the time-dependent water distribution through advection, diffusion, chemical processing, and incoming pebble flux. The model extends to simulating JWST/MIRI spectra providing time-evolution of key observables.

Using these models, we examine the link between pebble drift and observable cold-water emission. Additionally, we show what observable signs transport processes leave and how they are distinguishable from signatures of disk chemistry.

3.17 Chemical Signatures of External Irradiation in Protoplanetary Disks # Poster 17

Presenter: Luke Keyte
Affiliation: Queen Mary University of London

Most stars form in clustered environments where protoplanetary disks are exposed to intense FUV radiation from nearby massive stars. This external irradiation reshapes disk structure through photoevaporation and profoundly alters the chemical inventory available for planet formation. I will present an overview of recent work aimed at building a coherent picture of externally irradiated disk chemistry. Using new parametric models and thermochemical simulations, I perform a systematic investigation of how the abundances of key molecular species within disks vary as a function of their wider environment. I identify line flux ratios that serve as robust tracers of FUV field strength and indicators of photoevaporative winds. This work moves us toward answering a central question in planet formation: how does stellar birth environment control the chemical composition of disks, and the planets that form within them?

3.18 Modeling CN Emission to Constrain Gas Densities in IM Lup's Disk # Poster 18

Presenter: Isabella Macias
Affiliation: Massachusetts Institute of Technology

Accurate measurements of protoplanetary disk gas masses are essential for understanding planet formation and the chemical environments in which planets emerge. We present a complementary approach to constraining disk gas masses by using CN N = 3-2 (J = 7/2-5/2, 5/2-3/2) emission as a tracer of local gas density under non-local thermodynamic equilibrium (non-LTE) conditions in the protoplanetary disk around IM Lup. We develop a non-LTE radiative transfer framework coupled with Markov Chain Monte Carlo (MCMC) modeling to constrain the local gas density and derive a lower limit on the total gas mass of the disk. From these constraints, we evaluate the Toomre Q parameter to assess the gravitational stability of the IM Lup disk. The resulting gas density profile can be directly compared with independent disk mass estimates, demonstrating that non-LTE CN emission serves as a powerful probe of gas mass and gravitational stability in protoplanetary disks.

3.19 Chemical Modeling of the Innermost Regions of Protoplanetary Disks # Poster 19

Presenter: Mulan Madden
Affiliation: Leiden University

Planetesimal formation occurs in the optically thick mid-plane of protoplanetary disks. If planetesimals sequester material that is rich in volatile (C, O, S, N) and refractory (e.g., Fe, Si, Mg) elements, then these abundances originating from the innermost disk regions are expected to be significantly depleted. Additionally, dust traps can further deplete these elements. We present a physical-chemical model that predicts atomic emission line ratios, given a range of depletion factors and mid-plane densities ($15.75 \leq \log(n_H\ [\mathrm{cm}^{-3}]) \leq 16.25$). We use the photoionization and chemistry code Cloudy (v25.00) to create a 1D radial slab model of the innermost disk within the dust sublimation rim of a classical T Tauri system. Our model can be applied to observed line ratios in disks in order to determine if rocky planet formation has begun.

3.20 Disk evolution as constrained by the DECO Large Program # Poster 20

Presenter: Anna Miotello
Affiliation: ESO Garching

The unmatched capabilities of ALMA have enabled great advances in our view of disk physical and chemical structure, but our most studied systems are not representative of the entire disk and exoplanet populations. To expand the sample of chemically characterised disks, the DECO ALMA Large Program has surveyed 80 disks across four star forming regions, sampling a range of stellar masses, disk sizes, and environments. This program has targeted C2H, N2H+, and CO, which as a complete set allows us to derive gas-phase C/O and metallicity (C/H, O/H) via comparison with state-of-the-art astrochemical models. The disk gas compositions is analysed to search for commonalities/differences between regions and across the entire sample. In this talk I will summarise the main preliminary results from the DECO Large Program with a particular focus on a disk evolution study based on measured gas masse, gas radii, stellar masses and mass accretion rates.

3.21 Chemical evolution and dust drift in protoplanetary discs: linking models to JWST observations # Poster 21

Presenter: Tamara Molyarova
Affiliation: University of Leeds

The chemical composition of protoplanetary discs traces their physical conditions and the processes shaping their evolution. Recent JWST observations reveal diverse inner disc compositions and correlations between the observed emission of water and hydrocarbons and system properties, such as stellar mass and age, accretion rate, and the presence of substructures. In this study, we model dust evolution and drift in a protoplanetary disc together with chemistry across a range of disc properties. We predict correlations between the simulated disc quantities, in particular between the inner disc gas-phase C/O ratio and accretion rate, disc mass, and radius. We discuss how dust radial drift and chemistry jointly shape the inner disc composition under different drift regimes on timescales of a few Myr. We compare these predictions with existing JWST observations and discuss implications for interpreting observed trends.

3.22 Chemically layered structures and ionisation in the disk and envelope of NGC 1333 IRAS 4C: FAUST # Poster 22

Presenter: Shota Notsu
Affiliation: Department of Earth and Planetary Science, Graduate School of Science, The University of Tokyo

Recent molecular line observations with high spatial resolutions have revealed vertical chemical stratification in Class I/II disks. However, such structures have been investigated only for limited Class 0 objects. In ALMA Large Program FAUST, we report the results of molecular line observations toward the disk and envelope around the low-mass Class 0 protostar NGC1333 IRAS4C. Previous observations have shown that this object is nearly edge-on. We found that C18O and H2CO are distributed around the disk midplane. Molecules known as tracers of photochemical reactions such as CCH and c-C3H2 are distributed in the low density upper layer of the disk, unlike the distribution in L1527. Moreover, the column density ratio of HCO+/CO derived from the H13CO+ and C18O line emission suggests that the ionization degree and the ionisation rate varies with the disk radius and they are larger in the outer region of the disk and envelope.

3.23 DQ Tau: Disk Changes Across Periodic Accretion Bursts Using JWST-MIRI # Poster 23

Presenter: Judd Phillips
Affiliation: University of Exeter

The protoplanetary disk DQ Tau hosts an eccentric binary which leads to periodic accretion bursts up to 3L? every $\sim$16 days which offers a unique window into how the inner disk responds on observable scales. Using 9 JWST-MIRI observations across three accretion cycles, we fit DuCKLinG models to the observed spectra to investigate trends between disk parameters and accretion luminosity. We obtain temperatures, column densities, and emitting radii for both the gas and dust with their compositions. We conclude that the inner dust rim is coupled strongly to the accretion luminosity, dropping by $\sim$500K during quiescent periods, although the dust composition remains fairly consistent across the 9 epochs and is dominated by amorphous grains of Mg-Pyroxene and Mg-Olivine. We also find a strong relationship between the temperature and emitting area of the gas, not reacting directly to individual accretion bursts but instead varying on timescales of $\sim$30 days.

3.24 Molecular content in the disk and envelope of HL Tau: detection os sulfur-bearing species # Poster 24

Presenter: Pablo Riviere
Affiliation: Observatorio Astronomico Nacional

The evolution of chemical complexity during the process of star formation is key to our understanding of the emergence of life on Earth. In this context, a crucial step is to compare the molecular content across different evolutionary stages in order to identify chemical trends. We present interferometric observations of the molecular content in the envelope and protoplanetary disk of HL Tau, which allow us to compare molecular abundances and ratios in these two components and investigate possible evolutionary signatures. The observations trace the emission of sulfur-bearing molecules as well as deuterated species, which can be used to assess the evolutionary stage of the source. We discuss the observed structures in the context of previous studies of HL Tau. Finally, we compare our results with those obtained for other sources and environments in order to identify global chemical trends.

3.25 The sulfur content in protoplanetary disks # Poster 25

Presenter: Pablo Riviere-Marichalar
Affiliation: Observatorio Astronomico Nacional

Sulfur is the tenth most abundant element in the Universe, yet its budget across astronomical environments remains poorly constrained, a discrepancy known as the sulfur depletion problem. While sulfur abundances in the diffuse interstellar medium are consistent with solar values, they are significantly lower in denser regions such as starless cores. To investigate sulfur chemistry in planet-forming environments, we conducted an observational study of protoplanetary disks, which provide the material from which planetary cores and atmospheres form. Using observations with ALMA and NOEMA, we targeted a sample of young stellar objects in the Taurus-Auriga star-forming region. We then developed a grid of NAUTILUS astrochemical models to interpret the observed molecular emission and constrain sulfur chemistry and abundances in these disks. Our results provide estimates of the sulfur budget in both gas and ice phases and identify the dominant sulfur-bearing carriers. Finally, we place these findings in the broader context of astrochemical models of protoplanetary disks, highlighting implications for the overall sulfur abundance in planet-forming environments.

3.26 The CO snow line is highly dynamic in thermally self-consistent simulations # Poster 26

Presenter: Alfie Robinson
Affiliation: Imperial College London

Snow lines regulate the compositions of protoplanets by determining the phases of volatiles at given disc locations. Most models of volatile evolution use a fixed, passive heating temperature profile, yielding static snow lines. However, dust controls the disc's temperature; as the dust evolves, so must the temperature. As snow lines depend exponentially on temperature, their locations must also evolve. I present simulations of CO snow line evolution in a thermally self-consistent R-Z framework using the code cuDisc, in which the evolving dust and ice govern the temperature structure via their opacities. In contrary to standard models, we find that dust evolution leads to a dynamic CO snow line for much of parameter space; only simulations dominated by small grains show relatively constant snow lines due to slow dust evolution. I will discuss the implications of this result for planetesimal formation at snow lines and our interpretation of CO observations.

3.27 An Unbiased Chemical Inventory of Protoplanetary Disks with the SMA # Poster 27

Presenter: Clara Ross
Affiliation: Harvard University

Understanding the chemistry of planet-forming environments requires moving beyond targeted molecular studies towards comprehensive chemical inventories. Using the Submillimeter Array (SMA), we analyze 120 GHz broadband millimeter spectra of the environments surrounding four intermediate-mass stars: T Tau, MWC 480, AB Aur, and RY Tau. Across this bandwidth, we detect 14 unique molecules in multiple transitions. The sources exhibit a diversity of C/O ratios and ionization levels consistent with distinct evolutionary states. T Tau hosts the least evolved, most O-rich, and most ionized environment, while MWC 480 is the most evolved, most C-rich, and least ionized disk in the sample. The results suggest a potential trend for gas-phase carbon enrichment over time, and more broadly highlight the diagnostic power of wideband millimeter spectroscopy for probing chemical evolution in protoplanetary disks.

3.28 Recent Planetesimal Disruption in the RW Aurigae Star System # Poster 28

Presenter: Beth Sargent
Affiliation: SETI Institute

The RW Aurigae star system shows evidence for recent cataclysmic disruption of one or more planetesimals. Its light curve reveals major dimming events, which, combined with X-ray data, suggests the introduction of large amounts of material obscuring the star. Contemporaneous near-infrared observations show jets of material being ejected. Initial dust emission modeling suggests significant processing of the circumstellar dust. This suggests the disruption of planetesimal(s) near RW Aur A. Observations by the James Webb Space Telescope (JWST) MIRI Medium Resolution Spectrometer confirm jets being ejected from the A component of the system. The A and B components are separated by ∼1.4", so we are proceeding carefully with extracting the separate A and B spectra from the MRS data. After doing so, we will pursue more refined modeling of the emission from circumstellar dust, seeking evidence for formation of chondrules and calcium-aluminum inclusions (CAIs) resulting from the planetesimal disruption event(s).

3.29 Is the inner disk composition regulated by the disk and stellar properties or the existence of substructures? # Poster 29

Presenter: Sofia Savvidou
Affiliation: Space Telescope Science Institute (STScI)

Prior studies have shown that the chemical composition of the inner protoplanetary disk can be shaped by the inward transport of solids from the outer disk, with volatiles evaporating at their individual icelines and enriching the inner disk gas. Recent JWST observations have also revealed enhanced water abundances in compact, smooth disks compared to extended substructured ones, consistent with efficient volatile delivery by pebble drift in smooth disks. On the other hand, substructures, such as pressure bumps and gaps, could regulate this radial transport by trapping the inwardly drifting dust. The variations in the observed inner disk compositions are often attributed to the disk or stellar properties, however, we aim to determine how strongly these differences are instead shaped by the presence of (even undetected) substructures. In order to answer this question, we perform numerical simulations probing various stellar masses from 0.1 to 1.3 solar masses to investigate the influence of the stellar properties, varying the disk size, along with the gap depth, the timing for the introduction of the gap, and α-viscosity which affects the accretion rates.

3.30 JWST reveals disc diversity, ice features, and extended molecular emission in the binary system HK Tau # Poster 30

Presenter: Alice Somigliana
Affiliation: Max Planck Institute for Astronomy (MPIA)

The binary system HK Tau consists of a face-on and edge-on disc-bearing stars; this offers a unique opportunity to investigate the spectral features in multiple systems, as the complementary inclination allows to simultaneously explore both the gaseous and icy state chemistry. JWST/MIRI observations of HK Tau show a line-rich primary and stunningly line-poor secondary - except for atomic ions and molecular hydrogen emission; furthermore, thanks to the high inclination of HK Tau B, we detect several ice species in absorption. Extended H2 emission coming from the secondary traces a wind originating from the upper layer of the disc around B, with a magnetohydrodynamic or photoevaporative origin; the intensity and morphology of the ionised atomic lines supports this interpretation. The stark contrast in the spectra is likely to be attributed to a physical mechanism beyond the disc inclination - namely, tidal truncation enhancing disc evolution in the secondary star.

3.31 Chemical impact of envelope accretion onto the nascent disk in L1527 # Poster 31

Presenter: Hugo T'KINDT
Affiliation: Institut de Planetologie et d'Astrophysique de Grenoble (IPAG)

In recent years, protostellar disks have been detected around Class 0/I protostars. Unlike protoplanetary disks, these young disks are still accreting material from a surrounding envelope. However, the impact of this envelope on the formation and chemical composition of protostellar disks remains unclear. To start answering this question, we conducted an unbiased spectral survey targeting the large-scale envelope of the Class 0/I protostar L1527 using NOEMA and the IRAM 30m telescope. We calculated the abundances of more than 30 molecules at several positions of the source. We found no chemical changes in the material getting closer to the disk. We compared our results with the chemical composition of protoplanetary disks and found they are consistent with each other, hinting at chemical inheritance from the natal environment onto Class II disks. Similar studies in other Class 0/I sources are required to assess in more detail if there is chemical inheritance.

3.32 Measuring accurate gas masses in planet-forming disks in Lupus # Poster 32

Presenter: Estephani TorresVillanueva
Affiliation: University of Wisconsin - Madison

We present new ALMA observations of N2H+ (J=3-2) emission from 24 protoplanetary disks in the Lupus star forming region. For each source, we analyze the N2H+ emission morphology to obtain the line integrated flux. We then combine the N2H+ line integrated flux with archival 13CO and C18O in the (J=2-1) and (J=3-2) fluxes along with a large grid of thermochemical models to constrain the total disk gas masses for the 24 disks. By jointly modeling these complementary tracers, we aim to better constrain the bulk gas reservoir while accounting for chemical effects that can bias gas-mass estimates based on CO isotopologues alone. With this data, we will present gas mass estimations along with CO abundance measurements. The first results will provide a better view of the larger population of the 1-3 Myr old protoplanetary disks in the Lupus region.

3.33 Molecules in the shadows of HD 143006: chemistry and disk properties from simultaneous line models. # Poster 33

Presenter: Sierk van Terwisga
Affiliation: IWF Graz

The inner disk of the T Tauri star HD 143006 is inclined with respect to the outer disk, thus casting a broad shadow over approximately half of it. This unique geometry allows us to study how molecular emission is affected by varying the stellar radiation field alone. We use high-resolution ALMA observations of 10 lines, plus literature data and results like the 12CO emitting surface to study the contrasts between the illuminated and shadowed sides. Unlike in scattered light, these contrasts are generally surprisingly small. Both halves of the disk are modelled with ProDiMo and fit to the observations using a genetic procedure to explore the parameter space. After convergence, the contrasts in the molecular emission are consistent with slow gas heating / cooling compared to orbital timescales in the outer disk, and with an outer disk C/O ratio close to 1 from C3H2 and CS lines.

3.34 The effects of pebble drift as seen in the inner disk with JWST-MIRI # Poster 34

Presenter: Marissa Vlasblom
Affiliation: Leiden Observatory

Most planets are thought to form in the inner regions of protoplanetary disks, and inherit their compositions directly from this zone. However, the composition of the inner disk can change strongly with time due to the drift of icy pebbles. JWST-MIRI observations of the inner disk reveal a great diversity in molecular content, potentially driven by this. Therefore, understanding the effects of pebble transport is of great importance. In particular, cold H2O emission is often associated directly to the sublimation of ices at the snowline. However, when taking into account both transport and disk chemistry, this work finds that such an enhancement of cold H2O can be obtained solely by a pile-up of dust in the inner disk, even when no ice sublimation has occured alongside it. This demonstrates the importance of modeling efforts to reveal additional complexities in linking transport processes to JWST-MIRI observations of the inner disk.

3.35 Externally Irradiated Disk Chemistry: A JWST MIRI Case Study of Proplyds in NGC 1977 # Poster 35

Presenter: Qijia Zhou
Affiliation: Harvard University/CfA

Planet formation is influenced by the chemical and structural properties of protoplanetary disks. While past observations have focused on isolated disks due to their observational accessibility, most stars form in clusters where external ultraviolet radiation from nearby massive stars influences disk chemistry. Using mid-infrared observations from JWST MIRI, we investigate the chemical composition of seven externally irradiated disks located in NGC 1977, tracing an irradiation regime representative of the typical star-forming environment in the Milky Way. We find that the inner disk water reservoir, C/O ratio, and molecular ion content vary within the sample, with trends linked to FUV field strength among similar stellar hosts. Other tracers enable us to characterize ionization conditions and mass loss rates in internal and externally driven winds. Our results indicate that disks in clustered environments can exhibit a diverse chemical inventory, with some retaining molecular reservoirs that can contribute to terrestrial planet formation.

4 Planets in discs and how they shape them

4.1 The interplay between the snowline pebble flux and planet formation # Poster 1

Presenter: Danila Astrakhantsev
Affiliation: University of Exeter

Recent JWST studies have shown that we can place constraints on the midplane snowline pebble flux in ∼1Myr old discs. We use chemcomp simulations to explore the effects of the snowline pebble flux on growing and migrating planets in diverse discs. We find a strong correlation between the pebble mass flux (at the time of protoplanet insertion) and the final planet masses; with giant planet formation requiring snowline pebble mass fluxes >100 M?/Myr. Additionally, we explore the feedback of gap-opening planets on the snowline pebble flux, generally finding that giant planets reduce the snowline pebble flux only temporarily due to their quick growth and migration across the snowline (particularly in higher turbulence discs). Ultimately, our results represent a next step in connecting ongoing disc and planet formation processes, as glimpsed by JWST in this case, to diverse planet formation outcomes.

4.2 Protoplanetary disc structures of T Tauri stars in the visible with LBT/SHARK-VIS high-contrast imager # Poster 2

Presenter: Maciej Bajor
Affiliation: University of Rome Tor Vergata, INAF OAR

We present the results of data post-processing and analysis for a subset of pre-main sequence stars observed with SHARK-VIS high-contrast imager at the Large Binocular Telescope. Our observations in the visible band performed with the Hα filter reveal protoplanetary disc structures in higher resolution and at closer separations than in the earlier works, allowing for a detailed study of targets such as CQ Tau and UX Tau A. These features, retrieved with iterative post-processing methods, provide new insight on the potential presence of substellar companions in formation, although at this time we are not confident in any such detection.

4.3 Sandwiched Planet Formation in Action: Multiwavelength Diagnostics from NIR to Centimetre Wavelengths # Poster 3

Presenter: Maria de Juan Ovelar
Affiliation: University of Warwick

Sandwiched Planet Formation (SPF) proposes that two Super-Earth planets embedded in a protoplanetary disc create a configuration of dust traps that limits the solid mass available for planet formation in the ring between them. This configuration also produces a distinctive dust grain size distribution across the ring pair: the outer ring is mainly populated by large (>1mm) grains while the sandwiched ring becomes depleted in those. We present SPHERE and ALMA synthetic SPF imaging observations based on multi-fluid hydrodynamical and radiative transfer simulations. The contrasting grain size populations produce a unique observational signature: the sandwiched ring is detected in both observations, while the outer ring is invisible at shorter wavelengths. We explore the effect of low turbulence values, migration, and, crucially, present predictions for Mid-Infrared and centimetre observations with E-ELT/METIS and SKAO, opening a new window to identify and study SPF candidates in current and forthcoming surveys.

4.4 Observed dust ring properties as probes of planet masses # Poster 4

Presenter: Amena Faruqi
Affiliation: University of Warwick

Observations have shown that protoplanetary discs display varied morphology, including features such as gaps and rings. These features could indicate a planet embedded in the disc, perturbing the dust and gas. Previous studies have found that measurable characteristics of a gas gap, such as the gap depth, width, and location, can be used to constrain the mass of the planet inducing the gap, allowing us to study the structure of natal planetary systems. However, the relationship between planet masses and the measurable characteristics of dust rings requires further study. I will present results produced using FARGO3D to investigate the relationship between the mass of a planet embedded within a disc and observable features such as the structure and location of the dust rings it produces. I will also discuss how this informs our understanding of the "pebble isolation mass" - the minimum theoretical planet mass required to form a ring.

4.5 A slim disc model for circumplanetary disc evolution # Poster 5

Presenter: Emmanuel Greenfield
Affiliation: Imperial College London

A central challenge in the field of planet formation relates to the mechanisms through which giant planets reach their final mass, and the processes limiting their growth. Gaia DR4 in late 2026 will better inform us about the mass function of cold giant planets. However, interpreting these distributions requires theoretical models that accurately capture the physics of late-stage accretion. Previous 3D simulations have shown that giant planets accrete from a circumplanetary disc (CPD) with large scale heights (H/R = 0.2-0.3). It is hence challenging to model these discs with a thin disc model, especially in the end stages of formation. To address this, we relax the thin-disc constraints and employ a slim disc model to simulate CPD evolution, correctly taking these high disc scale heights into account. We specifically consider the ratio of inflow to outflow at different temperatures, providing insights into the efficiency of mass accretion at late stages.

4.6 Disk evolution and planet formation in the Triple HD104237 System # Poster 6

Presenter: Antonio Hales
Affiliation: NRAO/ALMA

Planet formation is thought to be strongly suppressed in close ($\lesssim$10 au) binary systems due to disk truncation and material loss. We present new high-resolution (0.1?) ALMA observations of the young multiple system HD 104237, which resolve its gas and dust disks for the first time. The dust disk is compact, with a radius of 7-8 au and a low inclination ($\sim$20°), while CO(2-1) observations reveal a more extended gas disk reaching $\sim$26 au and closely aligned with both the dust disk and the binary orbit. The outer disk radius is consistent with theoretical expectations for truncation by the external companion, HD 104237-B. Despite its small size, the disk mass is comparable to that of much larger protoplanetary disks, suggesting that binarity limits where planets can form rather than removing planet-forming material. We also report the serendipitous detection of millimeter continuum and CO emission from HD 104237-E within the primary beam.

4.7 Reconstructing the Earliest Stages of Giant Planet Formation in Three Dimensions # Poster 7

Presenter: Jensen Lawrence
Affiliation: Massachusetts Institute of Technology

Highly inclined (i $\gtrsim$ 75°) protoplanetary disks are crucial for understanding planet formation because their viewing geometry allows for their 3D structure to be reconstructed tomographically. Here, we present high spatial ($\sim$0.2") and spectral ($\sim$25 m/s) resolution observations of the 12CO 3-2, 13CO 3-2, CS 7-6, and SO 8(8)-7(7) transitions in the nearly edge-on disk Gomez's Hamburger. We reconstruct each line's emission distribution, obtaining an unprecedentedly high-definition view of 3D disk structure. In particular, the 12CO and 13CO combine to map the thermal structure of the disk, as well as carbon isotope fractionation, CS and SO combine to map the C/O ratio, and spatially compact SO emission at the location of a previously-identified protoplanet candidate strengthens the case that Gomez's Hamburger is the site of ongoing giant planet formation. Combined, these results unveil the 3D structure of a planet-forming disk in exquisite detail.

4.8 Dust Trapping and Disc Evolution: How Giant Planet Formation Sculpts Disc Composition and Shapes Subsequent Planet Formation # Poster 8

Presenter: Luke Morriss
Affiliation: University of Leeds

Fewer than 14% of the 6000+ confirmed exoplanets are long-period giant planets. Upcoming Gaia data releases are expected to yield thousands more long-period giant planets, providing new opportunities to answer key questions about their formation. In my poster, I present initial results from my investigation into the impacts of giant planet formation on the surrounding disc and their effects on the formation of other planets. I develop models of giant planet formation within protoplanetary discs, considering processes such as pebble drift and dust trapping, which affect disc composition by regulating the radial distribution of solids and hence the material available for giant planet accretion. I also examine the relative importance of pebbles and planetesimals in accreting giant planet cores. I aim to investigate how giant planets influence disc evolution and the formation of other planets in the system by using Gaia data to compare systems with and without giant planets.

4.9 Eccentricity and Precession in Planet-Driven Protoplanetary Disks # Poster 9

Presenter: Cory Padgett
Affiliation: Clemson University

Massive planets can shape their natal disks by opening deep gaps that separate eccentric inner and outer disks. But how eccentric are these disks, and do they evolve? By balancing planet-excited eccentricity with nonlinear gas damping effects, we derive a semi-analytic eccentricity profile that agrees with numerical simulations. These eccentric disks can precess through bulk apsidal motion driven by azimuthal pressure gradients and secular gravitational interactions; we find the inner and outer disks generally precess retrograde and prograde, respectively. These results provide a quantitative framework for inferring planet and disk properties from observations of eccentric, precessing protoplanetary disks.

4.10 Changing your own path: The effect of circumbinary of planet on the disc # Poster 10

Presenter: Anna Penzlin
Affiliation: LMU-Munich

In the past decades, isothermal simulations of circumbinary disc have recreated large, eccentric, inner cavities comparable to GG-Tau or HD-142527. However, these simulations failed to match a series of new ALMA observation resolving the inner disc showing circular cavities of 20-50 au like CsCha. Considering the disc thermodynamics can resolve this. Due to damped wave propagation in discs with cooling on the orbital time scale, circumbinary disc cavities collapse to small, circular rings at the edge of the instability region around the binary. Planets around binary stars can reshape these small cavities. This talk highlights both, the planet effects on the size and symmetry of the circumbinary cavity depending on the planet's mass, and the disc effects on the planet migration in the changing environment. We show that the planets can reshape the conditions in the disc and strongly affect the final cavity and disc.

4.11 Sculpting planet-forming disks: the role of stellar flybys and gas Infall # Poster 11

Presenter: Pedro Poblete
Affiliation: Universite Grenoble Alpes

Protoplanetary disks evolve within stellar environments where interactions with nearby stars and interstellar gas are common. We investigate how such environmental processes affect Class II systems that host both a disk and embedded planets. Using 3D hydrodynamical simulations, we model a disk containing two planets in a 2:1 mean-motion resonance and subject it to two perturbations: a stellar flyby and the infall of a gaseous cloudlet. Dust is treated using a multi-species dust-as-particles approach that includes back-reaction on the gas phase. Flyby and infall perturbations significantly modify the disk structure and dynamics. Gas infall increases disk mass and excitation, producing eccentric and multi-ring dust morphologies, while a stellar flyby truncates the disk and compresses the dust distribution radially. These processes alter planetary accretion histories and may enhance solid enrichment. Environmental interactions during the Class II phase may therefore imprint structures that persist into debris disk stages.

4.12 Impact of gravity modeling in thin discs: resolving numerical convergence of GI and revealing overestimation of planetary masses # Poster 12

Presenter: Steven Rendon Restrepo
Affiliation: Leibniz-Instituts fur Astrophysik Potsdam

The Gravitational Instability (GI) is a key theory in planet formation, describing how a disk can fragment into clumps for efficient cooling. Most GI simulations use a thin-disc approximation (2D), employing either a zero or a finite smoothing length prescription for the gravitational potential. However, a finite smoothing length suppresses the Newtonian nature of gravity, inhibiting gravitational collapse, and does not respect Newton's third law. Conversely, vanishing smoothing lengths or solving a 2D Poisson equation artificially amplifies gravity.

I present an analytically derived, exact 2D self-gravity prescription (Bessel kernel) for 2D simulations, resolving these issues. Using 2D global simulations, I demonstrate how this method addresses the long-debated "convergence issue" in GI simulations that emerged with SPH/grid-based codes. Finally, I show that simulations employing small smoothing lengths-a practice still common-tend to overestimate both the mass and the number of formed objects by at least a factor of five.

4.13 Eccentricity growth of gap-opening planets in self-gravitating, inviscid discs # Poster 13

Presenter: Eleftheria Sarafidou
Affiliation: Queen Mary University London

The orbital evolution of giant planets is intimately tied to how they reshape their surrounding disc. Once a planet grows massive enough (of order a Jupiter mass) to carve a gap, the balance of disc torques shifts in ways that can promote eccentricity growth rather than damping. In inviscid discs, two migration modes arise: one driven by vortex-planet interactions when the gap is shallow, and one in which a deep gap allows eccentricity to grow significantly as co-rotation resonances become inefficient at damping it (see eg. Goldreich & Tremaine 1980; Goldreich & Sari 2003; Lega et al. 2021). Since a planet's eccentricity in turn feeds back strongly on its migration, identifying the critical gap-opening mass threshold is key to understanding giant planet orbital histories. We present ongoing simulations of accreting planets in self-gravitating, inviscid discs aimed at quantifying this threshold and its consequences for migration.

4.14 Reversing massive planet migration: the role of gap structure and outer Lindblad resonances # Poster 14

Presenter: Chiara Eleonora Scardoni
Affiliation: University of Milan

Recent studies of the planet-dominated regime of Type II migration have revealed a correlation between the migration direction of massive planets and the parameter K, which quantifies the depth of the planetary gap: high (low) K values are associated with outward (inward) migration. The physical origin of this trend, however, remains uncertain. This work explores the mechanisms driving these behaviors using long-term, two-dimensional hydrodynamical simulations with live planets performed with FARGO3D. All planets initially migrate inward, but systems with sufficiently high K values undergo a torque reversal that leads to outward migration. This transition is accompanied by eccentricity growth in the outer disc and significant modifications to the gap structure. In particular, the surface density ratio at the 1:2 and 1:3 outer Lindblad resonances strongly correlates with migration direction. These results indicate that outward migration is primarily controlled by the relative strength of these resonances and the resulting gap profile.

4.15 Forming multi-ring structures in protoplanetary disks with migration jumps # Poster 15

Presenter: Kim Melanie Weiskopf
Affiliation: USM/LMU, group of Prof. Til Birnstiel

Through ALMA observations, we have been able to see dust substructures in protoplanetary disks in unprecedented detail. Especially rings and gaps are a common feature, often associated with gap opening planets. However, we observed many more rings and gaps than embedded planets. In this talk, I will present a new mechanism that explains multiple gaps and rings as a footprint of a single migrating planet. I will show how a single migrating planet is able to create multiple dust structures in a nearly inviscid, radiative disks, if the planet undergoes migration jumps. The analysis is based on a series of hydrodynamical simulations carried out with FARGOCPT. We found, that jumping planets can generate multiple dust structures, which stay observable for a significant fraction of the disks lifetime. We additionally link the slow migration phases to the strength of those structures and show, that large-scale vortices dissipate quickly in these disks.

5 Protoplanetary disc dispersal

5.1 An Observational Insight into Protoplanetary Disks: Role of Cluster Environment # Poster 1

Presenter: Saumya Gupta
Affiliation: Queen Mary University of London

Stars are building blocks of Universe and yet, role of star-forming environment on stellar evolution is not yet fully comprehended. We have studied three feedback-driven clusters, ONC, Cygnus OB2 and IC 1396. We use JWST F187N images to study proplyds in ONC and find variation of mass-loss rates with distance and UV flux. Our results quantify the strong effect of photoevaporation and address the famous proplyd lifetime problem. We next use Subaru HSC observations to study Cygnus OB2 and obtain diskless and disk-bearing sources. A low disk fraction suggests that external photoevaporation drives disk dissipation in Cygnus OB2. We study how feedback affects brown dwarf regime in IC 1396. We perform a comparative study to find that stellar density and UV flux do affect brown dwarf formation efficiency. This study provides substantial evidence of how star population is affected by stellar feedback and paves way for further studies.

5.2 Dust Entrainment in External Photoevaporative Winds: Theory and Observation # Poster 2

Presenter: Sasha Paine
Affiliation: Queen Mary University of London

The environment in which circumstellar discs evolve plays a crucial role in their evolution, and the formation of planets. An important, but under-studied aspect of this is what sizes of dust get entrained in the disc wind. This affects the amount and position of planet-forming solids, as well as dust shielding the disc from UV radiation. We have developed a particle solver to track the entrainment of dust in multi-dimensional simulations of photo-evaporating discs. Dust entrainment varies significantly: from sub-micron above the disc up to 100μm near the disc outer edge. This has implications for the structure of gas mass loss and observational characteristics of proplyds, especially in the infrared. We present synthetic images and SEDs of these discs at various wavelengths, from the optical to the mm-range - discussing what can be learned from them. We will focus on recovering dust grain sizes and composition from these images and spectra.

5.3 The dispersal of compact protoplanetary discs # Poster 3

Presenter: Giovanni Picogna
Affiliation: USM - LMU Munich

Compact protoplanetary discs are increasingly prominent observationally, but their dispersal pathways remain uncertain. To quantify the role of disc outer radius in internal photoevaporation, we performed radiation-hydrodynamic simulations of X-ray-driven winds. We find that while surface mass-loss profiles are size-independent, integrated wind rates decrease significantly for compact discs.

We derived a physically motivated scaling relation for this reduction and incorporated it into population synthesis models alongside external photoevaporation. Our results show that compact discs disperse more slowly via inside-out clearing. This size-dependent dispersal successfully reproduces observed disc fractions and the persistence of highly accreting systems at late times (>4 Myr), outperforming extended disc models.

We conclude that dispersal prescriptions must incorporate critical radius dependence. Our scaling provides a vital correction to accurately capture compact disc evolution and match growing observational constraints.

5.4 Bringing the HD 141569 Transition Disk into Focus with High Resolution ALMA CO Observations # Poster 4

Presenter: Catherine Sarosi
Affiliation: University of Exeter

Within the first 10 Myr of their lives, protoplanetary disks undergo a dramatic transformation. They rapidly lose mass as their gas and dust disperse, leaving behind Pluto-like planetesimals that grind down to form debris disks. The short-lived process of protoplanetary disc dispersal is difficult to observe, but the disk around the ~5 Myr Herbig Be/Ae star, HD 141569A, appears to have been caught in the act.

We present high spatio-spectral resolution (<25 au, ~100 m/s) ALMA Band 7 CO observations, which reveal the complex distribution and kinematics of gas in the HD 141569 system. Leveraging image-domain parametric modeling tools, we reveal asymmetries in gas density and non-Keplerian kinematics indicative of strong pressure gradients. Our observations and methods facilitate direct comparison to the exoALMA and ARKS ALMA large programs, allowing us to interpret HD 141569 in the context of gas observations in protoplanetary and debris disks.

5.5 Photoevaporation of discs by massive binary stars # Poster 5

Presenter: Sunder Singh-Bal
Affiliation: University of Sheffield

External photoevaporation due to far-ultraviolet (FUV) radiation is known to have a large impact on protoplanetary discs around young stars. The radiation is absorbed by gas within the disc, causing it to heat up and escape from the discs. In regions of high stellar density, discs may be entirely destroyed within 10 Myr, preventing the formation of gas giant planets.

Most massive FUV-emitting stars are observed to be in binaries, and a significant number of low-mass disc-bearing stars are in binaries. Therefore, stellar multiplicity must be considered when modelling the impact of external photoevaporation in a typical star cluster.

Here we investigate the effect of high-mass binary stars on disc destruction within N-body simulations. We use existing models to determine disc mass-loss rates, and compare the amount of disc destruction between simulated clusters with and without high-mass binaries.

5.6 Tracing hidden gas in the disk of RZ Psc # Poster 6

Presenter: Gabriella Zsidi
Affiliation: University of Hawaii

Gas is expected to dissipate from protoplanetary disks within ~10 Myr, leaving behind gas-poor debris disks. The 20-50 Myr system RZ Psc, which is thought to host an extreme debris disk, challenges this paradigm. We combine multi-filter photometric monitoring with optical and infrared spectroscopy to probe both the dust and gas components of the disk. The light curves show recurrent dimming events caused by occultation from dusty inner disk material, which we use to constrain dust properties (e.g. grain size). Spectroscopic diagnostics reveal signatures of weak accretion - which we model with magnetospheric accretion flow models -, as well as tracers of outflows (e.g. Na I, variable P Cygni profile of the He I triplet), but no CO emission. These results indicate the presence of primordial gas, suggesting that RZ Psc hosts a rare long-lived disk and provides a laboratory to study disk evolution beyond typical dispersal timescales.

6 Debris Discs

6.1 DebrisPy and Secularly Driven Structures in Debris Discs # Poster 1

Presenter: Deniz Akansoy
Affiliation: DAMTP, University of Cambridge

Recent advancements in observations of debris discs have enabled increasingly detailed measurements of their structure, the interpretation of which requires links between observed morphology and the underlying particle distribution. Azimuthally averaged surface density (ASD) profiles provide a radial characterisation of the mass distribution, where diagnostic features can be more effectively isolated and connected to system dynamics. In this work, we introduce DebrisPy, an open-source Python package designed to make recent analytic advances in ASD modelling accessible to the community. The package implements a modular framework for computing ASD profiles from user-defined semi-major axis and eccentricity distributions, enabling efficient exploration of parameter space. As a key application, we focus on debris discs undergoing evolution driven by secular planetary perturbations, which impose a characteristic eccentricity profile reflected in sharp ASD features. We describe the origin and detectability of these features, and the constraints on planetary properties inferred from them.

6.2 Searching for planets & finding discs: JWST NIRCam's sensitivity to debris discs # Poster 2

Presenter: Raphael Bendahan-West
Affiliation: University of Exeter

With exceptional sensitivity in the near-infrared, JWST extends the detection parameter space to sub-Jupiter exoplanets for the first time. With a combination of NIRCam coronagraphic programs (3989, 4050, 5835, 6005), we have targeted over 170 nearby and young stars, which were observed simultaneously at 2.0 and 4.4μm. While a few potential candidate companions have been identified, these observations have demonstrated a remarkable sensitivity to debris discs, resulting in multiple first-ever resolved images and even revealing previously unknown discs, especially around M-dwarf host stars. The well-characterised samples of these programs, covering a range of ages and spectral types, enable us to start assessing debris disc detection rates and the sensitivity limits achievable with JWST NIRCam. The resolved structures of these discs also offer further constraints on the underlying planetary populations, with inner cavities and gaps indicating the dynamical influence of unseen companions.

6.3 Automatic exocomet detection in spectra and light curves of β Pictoris # Poster 3

Presenter: Michael Elston
Affiliation: University of Canterbury

β Pictoris is the prime target for exocometary studies, showing time variable absorptions in spectral lines. Material in exocomets sublimate with proximity to β Pic, creating a detectable coma and dust tail. Due to their small size and inability to emit light, detection of exocomets has been a rather manual/semi-automatic process. We have developed a completely automatic fitting procedure to detect exocomets in spectra and photometry, which also provides physical characteristics of the observed exocomets. In this paper, I describe the parametrization, computation, and numerical methods used in developing these pipelines. We have applied these automate pipelines to an extensive dataset of dedicated high-resolution spectra of β Pic, alongside 10 TESS light curves. The extended baseline enables this study to investigate all types of exocometary features and extract population statistics. Finally, probable assumptions enable orbit fitting of exocomets to constrain whether objects detected through photometry exist at larger orbital radii as theorised.

6.4 Polarimetric observations of selected debris disk stars with NEOPol # Poster 4

Presenter: Agnieszka Gurgul
Affiliation: Nicolaus Copernicus University in Torun

Polarimetric observations of debris disk stars serve as a powerful complementary technique to photometry and spectroscopy, enabling the characterization of dust properties and disk geometry by measuring the polarization state of scattered light. In this study, we present photopolarimetric results obtained with NEOPol, a prototype polarimeter developed for the European Space Agency (ESA) to support Near-Earth Object monitoring. NEOPol's first-light tests were conducted using the 60-cm Cassegrain telescope at the Nicolaus Copernicus University in Torun and the 1-m ESA Optical Ground Station in Tenerife. We measured polarimetric parameters for eight stars with resolved debris disks, finding low polarization degrees (0.20-0.43%), consistent with expectations. Instrument performance was evaluated using polarized and unpolarized standard stars, yielding a precision of $\sim$0.1% in linear polarization degree and a few degrees in polarization angle. We also explored correlations between polarization and stellar or disk properties, providing a basis for future, higher-precision studies.

6.5 A Scorpius-Centaurus sample of scattered light debris disks # Poster 5

Presenter: Elisabeth Matthews
Affiliation: Max Planck Institute for Astronomy

Scorpius-Centaurus (Sco-Cen) is the nearest OB association. Its proximity ($\sim$140pc), young age ($\sim$15Myr), and large number of stars make it ideal for studying "teenage" stars whose protoplanetary disk has dispersed. Many of these systems retain debris disks: massive belts of planetesimals and dust analogous to our asteroid and Kuiper belts. Planets might shape these disks through dynamical interactions generating disk gaps, warps, and eccentricities. I will present VLT/SPHERE disk images of several debris disks in Sco-Cen, revealing structures such as multi-ring architectures, extended halos of dust, and complex warps. A subset have archival ALMA observations, allowing a more complete view of the disk properties and for comparisons between the measured ALMA observations (of the parent planetesimals) and SPHERE observations (of the the small grains). Finally, I will present our sensitivity to planets in these observations, and the implications for possible planet-debris disk interactions in these systems.

6.6 Disc caught at the transition from protoplanetary to debris stage # Poster 6

Presenter: Karolina Szewczyk
Affiliation: University of Leeds

Forming planetary systems caught in transition from protoplanetary to debris disc are so rare that only one object, HD141569, was known until now. Using ALMA observations, we detect 12CO gas and millimetre dust in another recently dispersed disc, HD44892, at 2Myr of age. We searched for continuum, 12CO, 13CO, and C18O (J=2-1) emission. The detected 12CO gas and dust emission result in CO gas and dust masses of the order Mco=10^-4Mearth and Mdust=0.01Mearth, assuming they are optically thin. From the non-detections of 13CO and C18O we provide upper limits on the total CO gas mass of around

Mco=10^-2Mearth. Our target star shows a 12um fractional excess comparable to HD141569, which falls within the transitional phase between protoplanetary and debris disc. Studying these unique systems helps us understand the processes that drive gas dispersal and its influence on the early stages of formation and evolution of planets and planetary systems.