

# **Core2disk III**

**lundi 25 septembre 2023 - vendredi 20 octobre 2023**

**Institut Pascal**

## **Programme Scientifique**

**CORE2DISK III -****Week 1 - The role of magnetic fields in disk formation, evolution, and planet formation**

*MONDAY 25th - Magnetic fields , non-ideal MHD, collapse models*

9.15-9.45 am registration (distribution of building access badges and lunch tickets)

9.45-10.00 : Welcome Introduction by Institut Pascal Director

2 « review » talks (35'+5')

10.00-10.40 Tomida (MHD models for star formation)

10.40-11.20 Offner (models with ionization from protostellar CR)

11:20-12:00 Discussion in amphitheater / coffee

12:00-12:45: 3 contributed talks (10'+5') Gonzalez (multiplicity in models vs obs), Mauxion (non-ideal disk formation+evolution with Idefix), Commercon (disks in massive star formation)

1 pm: Buffet at the Institut Pascal

Afternoon: collaboration time and discussions

*TUESDAY 26TH - Observations of disks and B fields*

9:30-10:10 Ohashi (e-disk ALMA), remotely from Hawaii (10pm local time) - 10:10-10:50 Girart (obs of B fields)

10:50-11:50 Discussion in amphitheater / coffee

11:50-12:40: 3 contributed talks (10'+5')

Sturm (disk + dust properties from JWST data), Lebreuilly (Synthetic populations of protoplanetary disks), Ngo (measuring Class 0 disk sizes from synthetic observations)

Afternoon: collaboration time and discussions in cathedral

*WEDNESDAY 27th - Dynamics: infall, streamers, outflows, fragmentation*

9:30-10:10 Pineda (streamers in protostellar envelopes) - 10:10-10:50 CF Lee (ALMA obs of disks and outflows)

10:50-11:50 Discussion in amphitheater / coffee

11:50-12:30 : 2 contributed talks (10'+5') Nacho Anez-Lopez (how to measure magnetic braking), Maureira (obs of IRAS16293, dynamics and dust properties)

Afternoon: collaboration time and discussions in cathedral

*THURSDAY 28th - Gas ionization, chemistry*

09:30-10:10 Redaelli (how to measure ionization from observations of cores) - 10:10-10:50 Le Gal (chemistry & ionisation in disks, MAPS etc) ?

10:50-11:50 Discussion in amphitheater / coffee

11:50-12:30: 2 contributed talks (10'+5') Pineda (ionization in NGC1333)

Girart (obs ionization B335)

Afternoon: collaboration time and discussions in cathedral

Restaurant dinner

*FRIDAY 29th - Dust evolution, polarization*

9:30-10:10 Kataoka (scattering, dust properties in disks)

10:10-10:50 Maury (polar and dust evolution in protostars)

10:50-11:50 Discussion in amphitheater / coffee

11:50-12:40: 3 contributed talks (10'+5'), Marchand (effect of grain size on coupling), Cacciapuoti (dust properties in L1527) Lombart (models of dust evolution)

Afternoon: wrap-up discussion towards week #2

Zoom link for the afternoon

**Week 2 - Constraints on magnetic winds vs turbulent disk evolution from population surveys, from Class 0 to Class II**

*Monday Oct. 2nd - Disk surveys in the continuum: which evolution from Class 0 to Class II?*

Chair: Anaëlle Maury

9:10-9:30am: registration (access badge and lunch tickets distribution)

9.30-9.45 introduction and summary of week 1 by Sylvie Cabrit/Benoit Tabone

9.45-10.20 review talk by Jonathan Williams ; Disk surveys in the :

10.20-10.40 am: Lukasz Tychoniec ; Class 0/I disk surveys in the (sub-)mm

Coffee break/discussions: 10.40-11.00 am

11.00-11.15 am: Akimasa Kataoka ; dust growth/properties (summary of week 1)

11.15-11.35 am: Andrew Sellek ; evolution of dust continuum with radial drift and growth for viscous disks

11.35-11.50 am: Francesco Zagaria ; evolution of dust continuum with radial drift and growth for MHD driven evolution

11.50-12.45: discussions

12.45 pm: buffet at the Institut Pascal

Afternoon

2.00-4.30 pm: Collaboration and discussions in small groups

4.30 pm: joint discussion in the amphitheater (TBD)

*Tuesday Oct. 3rd - Observational constraints on gas masses, radii, and accretion rates*

Chair: Leonardo Testi

Morning

9.30-10.00 am: review talk by Justyn Campbell-White ; Accretion rates in Class IIs results from recent surveys

10.00-10.20 am: contributed talk by Eleonora Fiorellino ; Accretion rates in Class I protostars

Coffee break/discussions: 10.20-10.50 am

10.50-11.25 am: review talk by Ted Bergin ; Disk gas mass estimates from molecular lines

## Contributed talks:

11.25-11.40 am: Dana Anderson ; benchmark of thermochemical models to infer gas masses  
11.40-11.55 am: Aashish Gupta ; Late infall and its potential effect on Class II disks  
11.55-12.45: discussions

## Afternoon

2.00-4.30 pm: Collaboration and discussions in small groups  
4.30 pm: joint discussion in the amphitheater + results of the AGE-PRO program by G. Rosotti  
5.30 pm: drinks at the Institut Pascal

*Wednesday Oct. 4th- Disk population synthesis models: achievements and next steps*

Chair: Giovanni Rosotti

## Morning

9.30-10.05 am review by Richard Alexander ; disk population synthesis approach: framework, method, and results  
10.05- 10.25 am: Alice Somigliana ; MHD-driven versus viscous evolution  
Coffee break: 10.25-11.00 am  
11.00- 11.20 am: Jesse Weder ; consistent models with PEW and MHD disk winds  
11.20- 11.40 am: Claudia Toci ; models of gas and disk radii evolution vs observations  
11.40-12.45: discussions

## Afternoon

Collaboration and discussions in small groups  
4.30 pm: joint discussion in the amphitheater (TBD)

*Thursday Oct. 5th- Disk photoevaporation models: current status and open issues*

Chair: Sylvie Cabrit

9.30-10.05 am: review by Uma Gorti ; Photoevaporative winds from turbulent disks: results and open issues  
10.05-10.25 am: Andrew Sellek ; the role of the X-ray spectrum in the mass-loss rates  
Coffee break: 10.25-11.00 am  
11.00-11.20 am: Ryohei Nakatani ; Are photoevaporative winds molecular ?  
11.20-11.40 am: Giovanni Picogna: Stellar mass dependency  
11.40-12.45: discussions

## Afternoon

2.00-4.30 pm: Collaboration and discussions in small groups - 4.30 pm: joint discussion in the amphitheater (TBD)

Conference dinner at Le Gramophone

Evening

*Friday Oct. 6th Open issues: Magnetic flux diffusion and Environmental effects*

Chair: TBD

**Morning**

9.30-9.45 am: summary of the Ringberg meeting by Geoffroy Lesur ; B-flux evolution and disk surface density profile

9.45-10.15: Discussion

10.15-10.45 am: Coffee break

10.45-11.20: review talk by Andrew Winter ; On the relevance and effects of external FUV on disk evolution

11.20-11.40 am: Rossella Anania ; Disk population synthesis for AGE-PRO with external FUV

11.40-12.00 am Dominika Itrich :Accretion and winds in irradiated regions seen by MUSE

12.00-12.10 am Emilie Habart ; JWST observations of irradiated disks in the Orion Bar

12.10-12.45: discussions

**Afternoon**

- Collaboration and discussions in small groups

- 4.30 pm: joint discussion in the amphitheater (TBD)

**Week 3: Disk winds: theories confront observations**

*MONDAY Oct 9: Physics of MHD Disk winds and Dead Zone location (chair: Lesur)*

9:00-9:30 registration of new comers (distribution of access badges and lunch tickets)

Review talks

9:30 – 10:05 Bai (basics of non-ideal MHD disk wnds and the dead-zone)

10:05 – 10:40: Zhu (basics of ideal-MHD winds in MRI-active turbulent discs)

10:40 – 11:10: coffee

Contributed talks (15'+5')

- 11:10 – 11:30 Flock (Dead zone location and dynamics: new results)

11:30 – 11:50 Zhi-Yun Li (Gas and Dust Structuring in Magnetized Wind-Launching Disks)

11:50 – 12:10 Martel (MHD models of transition disks)

12:10 – 13:00: 50' of open discussion + poster presentations (if any)

Afternoon: collaboration time and discussions in cathedral

*TUESDAY Oct 10: Observational evidence for disks winds and their properties (chair: Bacciotti)*

## Review talk

9:30 – 10:05 Dougados : Spatially resolved evidence of disk winds 2

## Contributed talks (15'+5')

10:05 – 10:25 Nisini (JWST observations of the HH46-47 system)

10:25 – 10:45: Whelan (spectro-astrometry of jets and winds)

10:45-11:15 Coffee

## Contributed talks (15'+5')

11:15 – 11:35 Flores (optical spectroimaging of the atomic component)

11:35 – 11:55 Lopez-Velazquez (multiple shells in the HH30 molecular outflow with ALMA)

11:55 – 12:15 Bacciotti (the layered HL Tau outflow seen with ALMA)

12:15-12:55: open discussion

## Afternoon:

14:00-14:35 (TBC): Banzatti (spectral signatures of low-velocity disk winds) - collaboration time and open discussions in cathedral

*WEDNESDAY Oct 11: Synthetic predictions for MHD and PE winds vs observations (chair: Cabrit)*

9.30-10.05: J. Goodman (thermo-chemistry and radiative transfer in PE and MHD disk winds)

10.05-10.25 (TBC) Gressel (heating and ionization in irradiated MHD disk winds)

10.25-11:00 : Coffee break

Contributed talks (15'+5')

11:00 -11.20 : Rab: synthetic predictions of line profiles for PE winds

11:20 - 11:40: Tabone: signatures of MHD disk winds vs observations

11:40 - 12:00 : summary on PE wind benchmarks from week 2

12:00 – 13:00 Discussion: how to discriminate between MHD and PE disk winds ? Afternoon: collaboration time and discussions in cathedral

Conference dinner

*THURSDAY Oct 12: Alternative interpretations (chair: Hennebelle)*

## Review talks

- 9:30 – 10:05 (TBC) Shang: magnetized bubbles as integrated and unified outflows
- 10:05 – 10:40 Cabrit (Models of outflow entrainment in young stars)
- 10:40 – 11:10 Coffee break

## Contributed talks (15'+5')

- 11:10 – 11:30 Podio (infall streamers in class 1 and class 2 wind sources)

11:30 – 11:50 Lesur (effect of planet gaps on MHD DW sub-structure)

11:50 – 12:50 Discussion: how to discriminate between disk winds and entrainment ? (1h)

Afternoon: collaboration time and discussions in cathedral SOC meeting to gather summary of week discussions

*FRIDAY Oct 13: Summary and Future Perspectives (chair: Tabone)*

## Contributed talks (15'+5')

- 9:30 – 9:50: Pinte (constraints on DW origin from disk kinematics)
- 9:50 – 10:10: Harrison (constraints on disk B-field from Zeeman measurements) 10:10 – 10:40: Coffee
- 10:40 – 13:00 Summary of progress made, major unsolved questions, and future paths (models, joint proposals, ELT opportunities...)

## Afternoon:

14:30 – 14:50 (15'+5'): Fendt (dynamo-driven disk winds)  
Collaborative work and open discussions

18:00 informal gathering for people staying in week 4

**Week 4: Planet formation and migration in magnetised disks***Monday 16 October 2023 - Observations of PPD structures (Chair: Sylvie Cabrit)*

## Review talks (35'+10')

- 9:00-9:30am: registration (access badge and lunch tickets distribution)
- 09:30-10:05 Myriam Benisty - Observational studies of disk structures
- 10:15-10:50 Jaehan Bae - Theoretical studies of disk structures

## Contributed talks (10'+5')

Christophe Pinte - ALMA observations of planet-induced kinematic kinks in PPDs

Stefano Facchini - Novel observations of disk kinematics and chemistry promoting planet formation

Alexandros Ziampras - Radiation-hydrodynamic simulations of planet-induced gaps

Coffee and discussion in the amphitheatre

Afternoon: collaboration time and discussions

*Tuesday 17 October 2023 - Dust growth and planetesimal formation (Chair: Farzana Meru)*

09:30-10:05 Anders Johansen (Remote talk) - The streaming instability

Contributed talks (10'+5')

10:15-10:25 Akimasa Kataoka - Recap from week 1 on observations of dust in discs

10:30-10:40 Francois Menard - Observations of dust properties in protoplanetary disks

Contributed talks (10'+5')

Francesco Lovascio - The polydisperse streaming instability Nathan

Magnan - Vortex-induced planet formation

Ziyang Xu - MRI turbulent trapping rings as efficient sites for planetesimal formation

Fabiola Antonietta Gerosa - New insights on planetesimal formation in turbulent disks

Katsushi Kondo - Snowline evolution in PPDs Coffee and discussion in the amphitheatre

Afternoon: collaboration time and discussions

*Wednesday 18 October 2023 - Models of planet formation (Chair: Richard Nelson)*

Review talks (35'+10')

09:30-10:05 Alessandro Morbidelli - Pebble accretion

10:15-10:50 Bertram Bitsch (Remote talk) - Giant planet formation

Contributed talks (10'+5')

Farzana Meru - Sandwiched planet formation: restricting the mass of the middle planet

Zhaohuan Zhu - Magnetospheric accretion and young planets

Yuri Fujii- Formation of satellites

Coffee and discussions in the amphitheatre

Afternoon: collaboration time and discussions

*Thursday 19 October 2023 - Detailed studies of planet migration (Chair: Zhaohuan Zhu)*

Review talk (35'+10')

09:30-10:05 Clement Baruteau - Overview of planet migration theory

Contributed talks (10'+5')



Elena Lega - Migration and accretion by giant planets in discs with laminar accretion flows  
Xuening Bai - Gap formation and migration by giant planets in discs with magnetised winds  
Gaylor Wafflard-Fernandez - Planet-disk-wind interactions in protoplanetary disks: massive planets in magnetized disks

Coffee and discussions in the amphitheatre  
Philippine Griveaud - Migration of giant planets in low-viscosity discs.  
Carolin Kimmig - Can magnetic disk winds induce planetary migration?

Afternoon: collaboration time and discussions

*Friday 20 October 2023 - Planet formation in magnetised discs: Solar System constraints, open questions and future prospects (Chair: Kees Dullemond)*

Review talks (35' + 10')  
09:30-10:05 Clara Maurel - Paleomagnetism and parent bodies in the Solar System  
10:15-10:50 Xuening Bai - Comparing non-ideal MHD disk simulations and paleomagnetic measurements  
Coffee and discussions in the amphitheatre

Collaboration time and discussions

**Summary discussion of Core2disk III workshop**