

# Zooming into the inner regions of proto-planetary disks

## Draft Work program first ISSI week

### Bern, 27-31 January 2020

Version November 22, 2019

<http://www.issibern.ch/teams/rockyplanform/>

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## Monday, January 27, 2020

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**10:00 - 12:30:** Introduction of all team members. *Each team member prepares 2 slides:*

- one with short summary of science interests, expertise
- one with what she/he wants to have better understood at the end of the project, or a top-two of things the ISSI team should have accomplished

**12:30 - 13:30:** Lunch

**13:30 - 15:30:** First session of the three subteams:

Theme 1: Observed properties of the inner regions of planet forming disks  
Theme 2: The assembly of rocky planets from grains to planetary embryos  
Theme 3: Interior of rocky planets and the composition of the primary atmosphere

- Introduction by one or two team members [TBD]
  - what models and observations are there already (in the team and in the world)
  - key questions that are not yet answered and we want to address
- formulate approach to address the key questions in the ISSI proposal:
  - what is **needed**? (models, observations, lab data,...)
  - where can **we** make progress?
- define outcome of the ISSI subteam: **deliverables**
- determine **work programme** for the week

**15:30 - 16:00:** Coffee/tea break

**16:00 - 17:30:** Plenary session with reports from the subteams

- output: a **consolidated work plan** for the first week

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## Tuesday, January 28, 2020

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**09:00 - 10:30:** Plenary session:

3 talks (15+15 minutes) addressing a key question: science talks about what the team members are working on now that is relevant for the main science questions that are addressed in the proposal. Not a review, but what people are working on themselves now.

**11:00 - 11:30:** Coffee break

**11:30 - 12:30:** Discussion time

**12:30 - 13:30:** Lunch break

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**Draft Work program first ISSI week**  
**Bern, 27-31 January 2020**

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**Tuesday, January 28, 2020 (continued)**

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**13:30 - 15:00:** Plenary session:

2 talks (15+15 minutes) addressing a key question: science talks about what the team members are working on now that is relevant for the main science questions that are addressed in the proposal. Not a review, but what people are working on themselves now. Followed by a 30 minute discussion

**15:00 - 15:30:** Coffee/tea break

**15:30 - 17:00:** Sub-team meetings

**17:00 - 17:30:** Plenary session: reports from the subteams, discussion

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**Wednesday, January 29, 2020**

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**09:00 - 10:30:** Plenary session:

3 talks (15+15 minutes) addressing a key question: science talks about what the team members are working on now that is relevant for the main science questions that are addressed in the proposal. Not a review, but what people are working on themselves now.

**10:30 - 11:00:** Coffee break

**11:00 - 12:30:** Sub-team meetings

**12:30 - 13:30:** Lunch break

**13:30 - 15:00:** Plenary session:

2 talks (15+15 minutes) addressing a key question: science talks about what the team members are working on now that is relevant for the main science questions that are addressed in the proposal. Not a review, but what people are working on themselves now. Followed by a 30 minute discussion

**15:00 - 15:30:** Coffee/tea break

**15:30 - 17:00:** Sub-team meetings

**17:00 - 17:30:** Plenary session: reports from the subteams, discussion

# Zooming into the inner regions of proto-planetary disks

## Draft Work program first ISSI week

### Bern, 27-31 January 2020

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#### Thursday, January 30, 2020

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**9:00 - 10:30:** Plenary session:

3 talks (15+15 minutes) addressing a key question: science talks about what the team members are working on now that is relevant for the main science questions that are addressed in the proposal. Not a review, but what people are working on themselves now.

**10:30 - 11:00:** Coffee break

**11:00 - 12:30:** Sub-team meetings

**12:30 - 13:30:** Lunch break

**13:30 - 15:00:** Plenary session:

2 talks (15+15 minutes) addressing a key question: science talks about what the team members are working on now that is relevant for the main science questions that are addressed in the proposal. Not a review, but what people are working on themselves now. Followed by a 30 minute discussion

**15:00 - 15:30:** Coffee/tea break

**15:30 - 17:00:** Sub-team meetings

**17:00 - 17:30:** Plenary session: reports from the subteams, discussion

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#### Friday, January 31, 2020

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**9:00 - 10:00:** Subteam meetings to formulate work plan for the coming year and prepare for the second team meeting

**10:00 - 10:30:** Coffee break

**10:30 - 12:00:** Plenary, wrap-up session:

- re-address the key questions that we should focus on
- identify what is needed to address these questions
- agree on the work plan for the period up to the second team meeting
- regular telcons and perhaps some team members can meet to work on some topics during the year
- make sure that the work gets done in the year we have for this

**12:30:** lunch and end of meeting

# Zooming into the inner regions of proto-planetary disks

## Draft Work program first ISSI week

### Bern, 27-31 January 2020

**Formation of three sub-teams that focus on the three main topics we want to have covered:**

**Theme 1: Observed properties of the inner regions of planet forming disks. Main questions:**

- 1. Quantify to which extent thermo-chemical and hydrodynamical models affect the interpretation of observations when compared to simple models.
- 2. Constrain the structure and composition of gas and dust in the inner disk, e.g. gaps, holes, mineralogy and C/O ratio.
- 3. Derive the fraction of elements is locked in solids (refractory and ice) throughout the inner disk
- 4. Translate solar system observables relevant for the formation of rocky planets to astronomical observations.
- 5. Observationally constrain the prevalence of gaps in the inner few AU of the disk and correlate this with planet occurrence statistics in mature systems

**Theme 2: The assembly of rocky planets from grains to planetary embryos. Main Questions:**

- 1. Study the structure of gas and dust in the inner disk regions and determine if these are compatible with compact migration-driven systems or with the classical formation scenario.
- 2. Study the impact of early embedding of planets onto the flow of material from the outer disk into the inner disk, through observational data and disk models.
- 3. Study the composition of the solids present in the disk and getting through to the star to determine if these particles originate in the outer disk.
- 4. Derive observable predictions of gas and dust distributions based on the different planet formation scenarios.
- 5. Derive observable architectures of planetary systems that result from different formation scenarios

**Theme 3: Interior of rocky planets and the composition of the primary atmosphere. Main Questions:**

- 1. Are bulk compositions constrained by mass-radius relation compatible with planetary formation histories? How well can bulk compositions derived from formation processes help in understanding the interior structure, evolution and internal dynamics of observed exoplanets?
- 2. Which information on the interior can be obtained from knowledge of the planetary formation environment?
- 3. Which core/mantle compositions can be expected based on bulk chemical compositions?
- 4. How does the interior affect the evolution of an atmosphere through processes as outgassing, recycling, and dynamo action (e.g. Noack et al., 2014 P&SS, 98, 14-29)?
- 5. How quickly is the primary atmosphere removed and the secondary atmosphere produced (e.g. Jin & Mordasini 2018, ApJ 853, 163)?
- 6. Where do volatiles come from: Ices on solids, direct gas accretion from the nebula, outgassing, late accretion?