UNIVERSITÀ DEGLI STUDI DI MILANO

**TO MAGNIFICO RETTORE OF UNIVERSITA' DEGLI STUDI DI MILANO**

**CODE 5564**

I the undersigned asks to participate in the public selection, for qualifications and examinations, for the awarding of a type A post-doc fellowship

**Thomas Pfeil**

**CURRICULUM VITAE**

PERSONAL INFORMATION

| | |
|---|---|
| Surname | Pfeil |
| Name | Thomas |
| Date of birth | 22.10.1994 |

PRESENT OCCUPATION

| Appointment | Structure |
|---|---|
| Ph.D. student | University Observatory,<br>Faculty of Physics,<br>Ludwig-Maximilians-Universität München,<br>Scheinerstr. 1,<br>81679 Munich, Germany |

EDUCATION AND TRAINING

| Degree | Course of studies | University | year of achievement of the degree |
|---|---|---|---|
| Specialization | - | - | - |
| PhD | Physics | Ludwig-Maximilians-Universität München | expected: 10/2023 |
| Master | Physics | Heidelberg University | 2020 |
| Bachelor | Physics | Heidelberg University | 2017 |
| Degree of medical specialization | - | - | - |
| Degree of European specialization | - | - | - |
| Other | - | - | - |

REGISTRATION IN PROFESSIONAL ASSOCIATIONS

| Date of registration | Association | City |
|---|---|---|
| - | - | - |

FOREIGN LANGUAGES

| Languages | level of knowledge |
|---|---|
| German | Mother tongue |
| English | Proficient (C1) |
| French | Basic (A1) |
| Spanish | Basic (A1) |

AWARDS, ACKNOWLEDGEMENTS, SCHOLARSHIPS

| Year | Description of award |
|---|---|
| - | - |

TRAINING OR RESEARCH ACTIVITY

Technical Skills:
- Programming with Python, Fortran, C, C++
- Experience using the finite difference (magneto)hydrodynamics code PLUTO
- Experience using the ISAAC, VERA, and COBRA computer clusters hosted by the Max Planck Society at the Max Planck Computing and Data Facility in Garching, Munich

Research Experience:
I have been working on numerical simulations of protoplanetary disks with the focus on hydrodynamic turbulence and dust evolution since 2017, resulting in the publication of 2 first-author papers in peer-reviewed journals.
I am also working on the application of machine learning methods within this field. The results of this work were recently published as a conference preceeding (NeurIPS 2022).

Teaching Experience:
- Astrophysics I (lecture held by Prof. Tilman Birnstiel at LMU Munich)
  - Tutoring of undergraduate students/exercise groups
- Astrophysics of the Solar System (seminar organized by Prof. Tilman Birnstiel at LMU Munich)
  - Mentoring of undergraduate students

PROJECT ACTIVITY

| Year | Project |
|---|---|
| 2020-2023 | Dust Evolution in Multi-Dimensional Hydrodynamic Simulations of Protoplanetary Disks (Ph.D. project) |
| 2022 | A Neural Network Subgrid Model of the Early Stages of Planet Formation (2022 Flatiron Machine Learning X Science Summer School) |
| 2019-2021 | High Resolution Simulations of Purely Hydrodynamic Turbulence and Flow Structure Formation in Protoplanetary Disks (M.Sc. thesis project) |
| 2017 | Stability Constraints for Protoplanetary Disks (B.Sc. thesis project) |

PATENTS

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CONGRESSES AND SEMINARS

| Date | Title | Place |
|---|---|---|
| 05/2022 | Poster Presentation: "Dust Evolution for 3D Hydrodynamic Simulations of Protoplanetary Disks | Exoplanets 4, Las Vegas, USA |
| 03/2022 | Invited Talk: "Dust Evolution for 1D, 2D, (and 3D) Hydrodynamics Simulations of Protoplanetary Disks | Yale Exoplanets & Stars Seminar (online) |
| 10/2021 | Invited Talk: "Turbulence, Sub Structure (and Dust Evolution) in Protoplanetary Disks with the Vertical Shear Instability" | Max Planck Institute for Extraterrestrial Physics, Munich, Germany |
| 03/2021 | Invited Talk: "Turbulence, Sub Structure, and Dust Dynamics in Protoplanetary Disks with the Vertical Shear Instability" | Cambridge Exoplanet Seminar (online) |
| 11/2020 | Poster Presentation: "The 'Sandwich Mode' of the Vertical Shear Instability" at: Virtual Workshop Planetesimal formation meeting | University of Copenhagen, (online) |

| | | |
|---|---|---|
| 12/2019 | Poster Presentation: "Turbulence in Protoplanetary Disk 'Dead Zones' is caused by Hydrodynamic Instabilities" at: Workshop Universality: Turbulence Across Vast Scales | Flatiron Institute, New York City, USA |

PUBLICATIONS

Books

Klahr, Hubert, **Thomas Pfeil**, and Andreas Schreiber (Nov. 2018). "Instabilities and Flow Structures in Protoplanetary Disks: Setting the Stage for Planetesimal Formation". In: Handbook of Exoplanets. Springer International Publishing, pp. 1–36. doi: 10.1007/978-3-319-55333-7_138

Articles in journals

Manger, Natascha, **Thomas Pfeil**, and Hubert Klahr (Dec. 2021). "High-resolution parameter study of the vertical shear instability - II: dependence on temperature gradient and cooling time". In: Monthly Notices of the Royal Astronomical Society 508.4, pp. 5402–5409. doi: 10.1093/mnras/stab2599

**Pfeil, Thomas** and Hubert Klahr (July 2021). "The Sandwich Mode for Vertical Shear Instability in Protoplanetary Disks". In: The Astrophysical Journal 915.2, 130, p. 130. doi: 10.3847/1538-4357/ac0054

**Pfeil, Thomas** and Hubert Klahr (Feb. 2019). "Mapping the Conditions for Hydrodynamic Instability on Steady-State Accretion Models of Protoplanetary Disks". In: The Astrophysical Journal 871.2, 150, p. 150. doi: 10.3847/1538-4357/aaf962.

Congress proceedings

**Pfeil, Thomas**, Miles Cranmer, Shirley Ho, Phil Armitage, Tilman Birnstiel, and Hubert Klahr (2022). "A Neural Network Subgrid Model of the Early Stages of Planet Formation". In: 36th Conference on Neural Information Processing Systems. Accepted at the Workshop on Machine Learning for Physical Sciences

OTHER INFORMATION

References:

- Prof. Tilman Birnstiel, Ludwig-Maximilians-Universität, Munich, Germany.
  E-Mail: til.birnstiel@lmu.de
- Prof. H. Hubertus Klahr, Max Planck Institute for Astronomy, Heidelberg, Germany.
  E-Mail: klahr@mpia.de
- Prof. Philip J. Armitage, CCA, Flatiron Institute, New York City, USA.
  E-Mail: parmitage@flatironinstitute.org

Declarations given in the present curriculum must be considered released according to art. 46 and 47 of DPR n. 445/2000.

The present curriculum does not contain confidential and legal information according to art. 4, paragraph 1, points d) and e) of D.Lgs. 30.06.2003 n. 196.

Place and date: Munich, 15.01.2023

SIGNATURE