

HANS-PAUL FREDERICK BAEHR

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BASIC INFORMATION

Citizenship: USA

Languages: native English, conversational German

Current position: Postdoctoral researcher; University of Nevada-Las Vegas, USA

Supervisor(s): Asst. Prof. Rebecca Martin and Asst. Prof. Zhaohuan Zhu

CONTACT

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EDUCATION

Doctor rerum naturalium (Ph.D.), magna cum laude, Astronomy – July 5, 2019

Thesis: Formation Criteria and Initial Constraints on Objects Formed in Self-Gravitating Disks

Ruprecht-Karls University, Heidelberg, Germany

Max Planck Institute for Astronomy, Heidelberg, Germany

Master of Science, Physics - March 20, 2015

Thesis: Conditions for Planet Formation via Gravitational Instability of Self-Gravitating Disks

Ruprecht-Karls University, Heidelberg, Germany

Max Planck Institute for Astronomy, Heidelberg, Germany

Bachelor of Science, Physics - May 4, 2012

Bachelor of Science, Mathematics - May 4, 2012

University of Utah, Salt Lake City, Utah, United States

High School Diploma – May 30, 2007

International Baccalaureate Diploma

West High School, Salt Lake City, Utah, United States

FIRST AUTHOR PUBLICATIONS

Baehr H., Klahr H., 2015, *The Role of the Cooling Prescription in Disk Fragmentation: Numerical Convergence & the Critical Cooling Parameter in Self-Gravitating Disks*, ApJ, 814, 155

Baehr H., Klahr H., Kratter K. M., 2017, *The Fragmentation Criteria in Local Vertically Stratified Self-Gravitating Disk Simulations*, ApJ, 848, 40

Baehr H., Klahr H., 2019, *The Concentration and Growth of Solids in Fragmenting Circumstellar Disks*, ApJ, 881, 162

Baehr H., Zhu Z., 2020, *Particle Dynamics in 3D Self-gravitating Disks I: Spirals*, ApJ, 909, 135

Baehr H., Zhu Z., 2020, *Particle Dynamics in 3D Self-gravitating Disks I: Dust Settling and Diffusion*, ApJ, 909, 13

CONTRIBUTING AUTHOR PUBLICATIONS

Gibbs A., ..., **Baehr H.**, et al., *EDEN: Sensitivity Analysis and Transiting Planetary Detection Limits for Nearby Late Red Dwarfs*, AJ, 159, 169

Gerbig K., Murray-Clay R., Klahr H., **Baehr H.**, *Requirements for gravitational collapse in planetesimal formation — the impact of scales set by Kelvin-Helmholtz and nonlinear streaming instability*, ApJ, 895, 91

Martin R., Zhu Z., Armitage P., Yang C.-C., **Baehr H.**, *Kozai-Lidov oscillations triggered by a tilt instability of detached circumplanetary discs*, MNRAS, 502, 4426

INVITED TALKS

Gravitational Instability in the Planet Formation Paradigm

University of Tübingen Astrophysicalisches Colloquium; Tübingen, Germany, November 14, 2016

Modeling Planet Formation in Young Self-Gravitating Disks

Formation and Dynamical Evolution of Exoplanets; Aspen, Colorado, USA; March 31, 2017

Self-Gravitating Disks and Planet Formation

2017 MIAPP: Protoplanetary Disks and Planet Formation and Evolution; Munich, Germany; May 29, 2017

Gravitational Instabilities: The Fastest Way to Form Planets

MPIA Königstuhl Colloquium; Heidelberg, Germany; June 14, 2019

GRANTS/PROPOSALS

Proposal for the Extension of Computing Time with the Jülich Supercomputing Centre: JUQUEEN

Title: *Gravoturbulent Planetesimal Formation*

Principal Investigator: Dr. Hubert Klahr

First renewal: **46 million** cou-hours; May 1, 2016 – April 30, 2017

Second renewal: **36 million** cpu-hours; May 1, 2017 – April 30, 2018

Application for Computing Time with the Jülich Supercomputing Centre: JUWELS

Title: *Gravoturbulent Planetesimal Formation*

PI: Dr. Hubert Klahr

Period: **2.7 million** cpu-hours; May 1, 2018 – April 30, 2019

COMPUTER SKILLS

Word processing with Microsoft Office and LaTeX. Coding with Python, C++ and FORTRAN.

Several years of experience using and modifying hydrodynamic mesh codes including [PENCIL](#), [PLUTO](#) and [Athena++](#).

TEACHING EXPERIENCE

Teaching Assistant, *Practical Course in Numerical Methods*
February 8 – February 19, 2016

Assisted in the supervision of the following students:

Bhavya Joshi, June 2017 – October 2018

Master thesis on the implementation of new methods in an adaptive mesh code

Dominic Batzler, October 2017 – July 2018

Bachelor thesis on the behavior and evolution of solids in 2D local fragmentation simulations

Konstantin Gerbig, December 2018 – September 2019

Master thesis on planetesimal formation via direct gravitational collapse of particles

OBSERVATIONAL EXPERIENCE

17 nights remote transit photometry with EDEN project, 1.23m telescope at Calar Alto, 2019-2020 (See Gibbs et al. 2020 for details)

OTHER RESPONSIBILITIES

Refereed for MNRAS

RESEARCH INTERESTS

Planet Formation

Circumstellar/Protoplanetary Disks

Self-Gravitating Systems

Hydrodynamic Simulations

PERSONAL INTERESTS

Football (both of them), basketball, ultimate Frisbee, cycling, skiing, and drawing, among other activities