Michael Hammer

https://lavinia.as.arizona.edu/~mhammer/

RESEARCH INTERESTS

Formation and Evolution of Planets, Protoplanetary Disks, and Planetary Systems

- Numerical simulations (Hydro-dynamics and N-body dynamics)

EDUCATION

University of Arizona, *Tucson, AZ* — August 2015 – Present

Ph.D. Candidate in Astronomy and Astrophysics — Advisor: Professor Kaitlin Kratter

Cornell University, College of Arts and Sciences, *Ithaca, NY* — May 2015

B.A. in Physics with an Astrophysics Concentration — [Minor in Computer Science]

AWARDS

(1) NSF Graduate Research Fellowship — August 2015 – June 2020

(2) Co-I, NASA Astrophysics Theory Program Grant — Awarded December 2016

- *Hydrodynamic processes in planet-forming accretion disks*

GRADUATE RESEARCH EXPERIENCE

Graduate Researcher — August 2015 – Present

Star and Planet Formation Theory Group, *University of Arizona* — *Tucson, AZ*

Advisor: Professor Kaitlin Kratter — Collaborators: Prof. Paola Pinilla and Prof. Min-Kai Lin

- Determined planet-induced vortices are less capable of forming when including planet's growth time
- Determined these vortices have elongated appearances in dust observations

UNDERGRADUATE RESEARCH EXPERIENCE (selected)

Undergraduate Researcher — January 2014 – June 2015

Theoretical Astrophysics Group, *Cornell University* — *Ithaca, NY*

Advisors: Dr. Diego Muñoz and Professor Dong Lai

- Utilized the Mercury package to analyze the stability of circumbinary planets with inclined orbits

LEAPS Intern (LEAPS Program at Leiden) — June 2014 – August 2014

Computational Astrophysics Group, *Sterrewacht Leiden* — *Leiden, The Netherlands*

Advisors: Dr. Lucie Jílková and Professor Simon Portegies Zwart

- Determined which types of stellar flyby orbits can transfer objects from one disk to the other

NSF REU Intern — June 2013 – August 2013

Solar Physics Group, *Harvard-Smithsonian Center for Astrophysics* — *Cambridge, MA*

Advisors: Dr. Kamen Kozarev and Dr. Kelly Korreck

- Analyzed kinematics of coronal shock waves with the goal of predicting space weather at the Earth

COMPUTATIONAL EXPERIENCE

Languages: Python, Java, IDL, Unix, C, C++, MATLAB, OCaml, HTML

Packages: FARGO, FARGO3D, & PLUTO (hydro), AMUSE (multi-purpose), Mercury and HUAYNO (N-body)

PUBLICATIONS (2 first-author, 6 total)

[1] **Hammer, M.**, Pinilla, P., Kratter, K., Lin, M.-K., 2019, *Observational diagnostics of elongated planet-induced vortices with realistic planet formation time-scales*, MNRAS, 482, 3609

[2] Kozarev, K., Davey, A., Kendrick, A., **Hammer, M.**, Keith, C., 2017, *The Coronal Analysis of SHocks and Waves (CASHeW) framework*, JSWSC, 7A, 32

[3] **Hammer, M.**, Kratter, K., Lin, M.-K., 2017, *Slowly-growing gap-opening planets trigger weaker vortices*, MNRAS, 466, 3533

[4] Jílková, L., Hamers, A., **Hammer, M.**, & Portegies Zwart, S., 2016, *Mass transfer between debris discs during close stellar encounters*, MNRAS, 457, 4218

[5] Jílková, L., Portegies Zwart, S., Pijloo, T., & **Hammer, M.** 2015, *How Sedna and family were captured in a close encounter with a solar sibling*, MNRAS, 453, 3157

[6] Kozarev, K. A., Raymond, J. C., Lobzin, V. V., **Hammer, M.** 2014, *Properties of a Coronal Shock Wave as a Driver of Early SEP Acceleration*, ApJ, 799, 167

TALKS (selected)

Planet-induced vortices: The effects of realistic planet formation timescales

(1) Star and Planet Formation in the Southwest 2 *(Oracle, AZ)* March 2018

(2) Protoplanetary Disk Discussion Workshop *(Los Alamos, NM)* August 2017

(3) Steward Observatory Internal Symposium *(Tucson, AZ)* September 2016

(4) Emerging Researchers in Exoplanets Symposium *(Ithaca, NY)* June 2016

Transferring Disks during Stellar Flybys

(1) LEAPS Symposium *(Leiden, The Netherlands)* August 2014

POSTERS (selected)

[1] **Hammer, M.**, Jílková, L., Portegies Zwart, S. 2015, *Transferring Mass between Circumstellar Disks during Stellar Flybys*. AAS 225, #349.02

[2] **Hammer, M.**, Kozarev, K. A., & Korreck, K. E. 2014, *Kinematics of Waves in the Solar Corona: Analyzing Potential Shock Waves to Predict Solar Energetic Particle Fluxes in Space Weather*. AAS 223, #158.02

WORKSHOPS

(1) NExSS Winter School: *Planetary Habitability (Tucson, AZ)*: February 2016

(2) NExScI Sagan Summer Workshop: *Exoplanet Demographics (Pasadena, CA)*: July 2015

OUTREACH

(A) **Teacher-in-training**, ISEE Professional Development Program March 2019 – June 2019
Teaching two-day instructional activity to undergraduate participants in AstroCom NYC

(B) **Author**, Astrobites December 2015 – December 2018
(i) My Articles: https://astrobites.org/author/mhammer/, (ii) Advertising chair, (iii) Social media czar

(C) **Teaching Astronomer**, Project ASTRO September 2017 – May 2018
Taught three classes of 7th grade students astronomy-themed lessons

(D) **Contributing Author**, ZME Science September 2014 – January 2015
My Articles: http://www.zmescience.com/author/michaelhammer/

(E) **Outreach Coordinator**, Cornell Society of Physics Students January 2012 – December 2014
(i) Organized outreach events, (ii) Recruited students to volunteer, (iii) Co-managed SPS Website

(F) **President**, Cornell Astronomical Society June 2013 – June 2014
(i) Ran weekly stargazing nights, (ii) Gave public lectures, (iii) Set up events with Astro. Dept.