JOONAS HERRANEN

Curriculum Vitae

PERSONAL INFORMATION

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RESEARCH PROFILE

Numerical light scattering

Development and application of a state-of-the-art efficient scattering solver for irregular scatterers, modelling especially the dynamical effects of radiation ie. forces and torques due to scattering.

Cosmic dust

Modelling shapes of dust grains and aggregates and their scattering properties is an integral part of e.g. understanding the radiative torque theory of dust and, further, the polarization of scattered and emitted light by dust.

Optical tweezers

Full dynamical simulations allow modelling optical tweezers, where small particles can be suspended and manipulated by light.

EDUCATION

2016 – Aug 2020 (planned)

PhD Astronomy
University of Helsinki
Research under the supervision of prof. Karri Muinonen

2015 – 2016

MSc Theoretical Physics
University of Helsinki
Overall grade 4/5

My MSc thesis, belonging to the field of astronomy, served as the starting point to my PhD research, and as such earned the grade of Laudatur.

2012 – 2015

BSc Theoretical Physics
University of Helsinki

OTHER EDUCATION

2015 – 2019

Subject teacher
University of Helsinki
I am a qualified teacher of Physics, Mathematics, Chemistry and IT up to the secondary (high) school level in Finland.

PUBLICATIONS

Herranen, J. 2020, *Rotational disruption of nonspherical cometary dust particles by radiative torques*, Astrophysical Journal, 893, 109.

Herranen, J., Markkanen, J., Videen, G., & Muinonen, K. 2019, *Non-spherical particles in optical tweezers: a numerical solution*, PLOS ONE, 12(14): e0225773.

Herranen, J., Lazarian, A., & Hoang, T. 2019, *Radiative torques of irregular grains: describing the alignment of a grain ensemble*, Astrophysical Journal, 878, 96.

Herranen, J., Markkanen, J., & Muinonen, K. 2018, *Polarized scattering by Gaussian random particles under radiative torques*, Journal of Quantitative Spectroscopy and Radiative Transfer, 205, 40.

Herranen, J., Markkanen, J., & Muinonen, K. 2017, *Dynamics of small particles in electromagnetic radiation fields: A numerical solution*, Radio Science, 52, 1016.

OTHER PUBLICATIONS

Herranen, J., & Lazarian, A. 2020, *Alignment of irregular grains by radiative torques: efficiency study*, Astrophysical Journal, submitted.

Herranen, J., Markkanen, J., & Muinonen, K. (2016). *Dynamics of Interstellar Dust Particles in Electromagnetic Radiation Fields* in 2016 URSI INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC THEORY (EMTS) (p. 251-254). New York: IEEE.

GRANTS AND FELLOWSHIPS

UH funded salary position for a PhD candidate — 2017 – 2020
University of Helsinki

Study grant — 2015, 2013
Student's foundation of Tavastia Nation

Undergraduate grant — 2015, 2013
Fund for Mathematics and Natural Sciences

AWARDS AND HONORS

Pro Gradu award exceptional MSc thesis — 2016
Faculty of Science, University of Helsinki

Bronze medal in the International Chemistry Olympiad — 2011
IChO 2011

SKILLS

Fortran, Python, Matlab 5+ yrs

Linux, Git 4+ yrs

Linux, Git, LaTeX 4+ yrs

Html/CSS, SQL 3+ yrs

LANGUAGE PROFICIENCY

Finnish Native

English Fluent

Swedish Bureaucratese

Japanese Conversational

ADDITIONAL ACTIVITIES

2020

The Night of Science
Bad Sci-Fi Night
A popular science lecture on science fiction tropes and related physics.

2018, 2019

International Asteroid Day
Organizer at the Helsinki Observatory's exhibition for general public as a part of the international event.

CONFERENCES

European Planetary Science Conference 2020
Virtual conference

European Planetary Science Conference / Annual Meeting for Division for Planetary Sciences joint conference 2019
Geneva, Switzerland

Cosmic Dust 2018, 2019
Sagamihara, Japan; Narashino, Japan

Electromagnetic and Light Scattering XVII / Laser-Light and Interactions with Particles 2018 joint conference 2018
College Station, TX

European Planetary Science Conference 2017
Riga, Latvia

Electromagnetic and Light Scattering XVI 2017
College Park, MD

Bremen Workshop on Light Scattering 2017
Bremen, Germany

Annual Meeting for Division for Planetary Sciences/ European Planetary Science Conference joint conference 2016
Pasadena, CA

Electromagnetic Theory Symposium 2016
Espoo, Finland

TEACHING EXPERIENCE

Statistical Inversion Methods 2020
Assistant teacher

Solar System Physics 2020
Assistant teacher

Fundamentals of Astronomy I 2018,2019
Assistant teacher

Fundamentals of Astronomy II 2018
Assistant teacher

Electromagnetic Scattering I 2016,2019
Assistant teacher

RESEARCH EXPERIENCE

Visiting researcher 2019
University of Wisconsin/Madison

Two-month research visit to prof. A. Lazarian, focussed on improving the predictivity of radiative torque theory.

Doctoral student 2016 – 2020
University of Helsinki