






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.

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 started my PhD research, and earned the highest grade of Laudatur.

2012 – 2015

BSc Theoretical Physics
University of Helsinki

Joonas Herranen

Curriculum Vitae

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.

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.

Other publications

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

Herranen, J. 2020, *Dynamical response of small particles to light scattering*, Doctoral dissertation, ISBN 978-951-51-6118-5 (pdf), ISSN 1799-3024, University of Helsinki Report Series in Astronomy, No. 24.

Grants and fellowships

UH funded salary position for a PhD candidate
University of Helsinki

2017 – 2020

Study grant
Student's foundation of Tavastia Nation

2015, 2013

Undergraduate grant
Fund for Mathematics and Natural Sciences

2015, 2013

Awards and honors

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

2016

Bronze medal in the International Chemistry Olympiad
IChO 2011

2011

Other education

2015 – 2019

Subject teacher

University of Helsinki

Qualification for teaching Physics, Mathematics, Chemistry and IT up to the secondary level in Finland.

Skills

Fortran, Python, Matlab 5+ yrs

Linux, Git, L^AT_EX 4+ yrs

Html/CSS, SQL 3+ yrs

Language proficiency

Finnish Native

English Fluent

Swedish Bureaucratic

Japanese Conversational

Additional activities

2020, Helsinki

The Night of Science

Bad Sci-Fi Night

A popular science lecture on science fiction tropes and related physics.

2018, 2019, Helsinki Observatory

International Asteroid Day

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

Conferences

EPSC

Virtual conference

2020

EPSC / DPS

Geneva, Switzerland

2019

Cosmic Dust

Sagamihara, Japan; Narashino, Japan

2018, 2019

ELS XVII / Laser-Light and Interactions with Particles (LIP) 2018

College Station, TX

2018

EPSC

Riga, Latvia

2017

Electromagnetic and Light Scattering (ELS) XVI

College Park, MD

2017

Bremen Workshop on Light Scattering

Bremen, Germany

2017

Annual Meeting for Division for Planetary Sciences (DPS) / European Planetary Science Conference (EPSC)

Pasadena, CA

2016

Electromagnetic Theory Symposium (EMTS)

Espoo, Finland

2016

Teaching experience

Statistical Inversion Methods

Assistant teacher

2020

Solar System Physics

Assistant teacher

2020

Fundamentals of Astronomy I

Assistant teacher

2018, 2019

Fundamentals of Astronomy II

Assistant teacher

2018

Electromagnetic Scattering I

Assistant teacher

2016, 2018

Research experience

Visiting researcher

University of Wisconsin/Madison

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

2019

Doctoral student

University of Helsinki

2016 – 2020