

Jere Remes

Curriculum Vitae

CURRENT POSITION	<p>Researcher, <i>Geological Survey of Finland</i>, Espoo, Finland (10/2022-6/2025)</p> <p>My main responsibility is to couple the hydrological simulation framework Amanzi-ATS to the thermo-mechanical modeling done with OpenGeoSys to have a complete mechanical model for soil going through freeze-thaw cycles and to lead the writing of the scientific article regarding these results. My tasks include developing the numerical code, developing the model, defining and computing the mathematical structure behind the simulations as well as writing the scientific article. The project is both in service of the study of the mechanisms behind frost quakes and also to eventually have a tool for risk-assessment for sub-Arctic infrastructure and built environments in changing climate.</p>
EDUCATION	<p>Doctor of Philosophy in Particle Physics, <i>University of Helsinki</i>, Finland (09/2015-01/2021)</p> <p>Dissertation title: <i>Probing the QCD Phase Diagram via Holographic Models</i></p> <p>Supervisors: Kimmo Tuominen, Aleksi Vuorinen & Niko Jokela</p> <p>Master of Science in Theoretical Physics, <i>University of Helsinki</i> (12/2014-09/2015)</p> <p>Master's thesis: <i>A Model of Composite Dark Matter in Light-Front Holographic QCD</i></p> <p>Supervisor: Kimmo Tuominen</p> <p>Minor: Mathematics</p> <p>Bachelor of Science in Theoretical Physics, <i>University of Helsinki</i> (08/2011-12/2014)</p> <p>Bachelor's thesis: <i>Kvanttikitka</i> (tr: Quantum Friction)</p> <p>Supervisor: Esko Keski-Vakkuri</p> <p>Minors: Mathematics, Physics</p>
WORK EXPERIENCE	<p>Postdoctoral researcher, <i>Departamento de Física, Universidad de Oviedo</i>, and <i>Instituto de Ciencias y Tecnologías Espaciales de Asturias (ICTEA)</i>, Oviedo, Spain (9/2021-08/2022)</p> <p>Research project title: <i>Exotic high-density phases of QCD in the Veneziano limit and the applications in neutron stars</i></p> <p>We studied strongly coupled systems in QCD using holography, developing a framework to include more complicated flavour structure in the high-density regime of the phase diagram, as well as on the improved fitting to lattice simulations for higher order cumulants to describe a realistic critical point. The main observational impetus was provided by the rapidly improving knowledge on neutron stars.</p> <p>Doctoral researcher, <i>University of Helsinki</i> and <i>Helsinki Institute of Physics</i> (10/2015 – 12/2020)</p> <p>I planned and implemented, in collaboration with my supervisors and co-authors, research projects concerned with the development and application of a theoretical and computational holographic framework to study strongly coupled systems found in heavy-ion collisions and in the interior of neutron stars. I defended my thesis on 14th December, with U. Gürsoy (Utrecht U.) acting as the opponent.</p> <p>Intern, <i>University of Helsinki</i>, Division of Elementary Particle Physics (5/2014 – 8/2014)</p> <p>I commenced the studies for my Master's thesis under the supervision of K. Tuominen and A. Vuorinen.</p>

Intern, *University of Helsinki*, Division of Astronomy and Geophysics (6/2013 – 7/2013)
I worked on the HG1G2/HG12 asteroid phase curve analyser Java application in the group of Prof. K. Muinonen.

Teaching Assistant, *University of Helsinki*, Department of Physics (11/2012 – 12/2012)
Course: Vuorovaikutukset ja aine (basic level mechanics course).

Tutor for physics students, *University of Helsinki*, Faculty of Science (Autumn 2012)

Teacher, Diani Busara Junior School, Ukunda, Kenya (6/2012 – 7/2012)
I volunteered as a teacher of mathematics and science for grades 4 to 8.

Graveyard worker, Parish of Kiuruvesi (6/2011 – 7/2011)

PUBLICATION LIST	<p><i>Thermo-mechanical and thermo-hydrological modeling of ground freezing and its impact on frost quake occurrence – the Tähtelä case study</i>, J. Remes, J. Okkonen, N. Afonin, E. Kozlovskaya, E.-R. Kokko, K. Moisio, C. B. Silbermann, T. Gerasimov, D. Naumov and T. Nagel <i>in preparation</i></p> <p><i>Robin boundary conditions and elastic properties for finite subdomain modeling</i>, J. Remes <i>in preparation</i></p> <p><i>Neighbourhood watch in mechanics: non-local models and convolution</i>, T. Nagel, T. Gerasimov, J. Remes and D. Kern. SIAM Review 67 (2025) 176 - 193</p> <p><i>Holographic QCD in the NICER era</i>, N. Jokela, M. Järvinen and J. Remes, Phys.Rev.D105 (2022), 086005, arXiv:2111.12101 [hep-ph]</p> <p><i>Unified weak/strong coupling framework for nuclear matter and neutron stars</i>, N. Jokela, M. Järvinen, G. Nijs and J. Remes, Phys.Rev.D103 (2021) 8, 086004, arXiv:2006.01141 [hep-ph]</p> <p><i>Quasinormal modes and thermalization in Improved Holographic QCD</i>, T. Alho, J. Remes, K. Tuominen, A. Vuorinen, Phys.Rev.D101 (2020) 10, 106025, arXiv:2002.09544 [hep-ph]</p> <p><i>Holographic QCD in the Veneziano limit and neutron stars</i>, N. Jokela, M. Järvinen and J. Remes, JHEP 1903 (2019) 041, arXiv:1809.07770 [hep-ph]</p>
SKILLS	<p>Science specialties: applied mathematics, numerical general relativity, string theory, elementary particle physics, quantum field theory, non-equilibrium dynamics, quantum chromodynamics. Currently hydrodynamics, hydrology, thermoelastic theory, continuum mechanics.</p> <p>Programming: C/C++, Python, Java, JavaScript, Ruby, HTML, CSS</p> <p>Typesetting, programs, etc: Mathematica, L^AT_EX, Git, Jupyter Notebook, Matlab, OGS</p> <p>Languages: Fluent Finnish, English, intermediate Swedish, basic French, Russian, Spanish</p>
VISITS, CONFERENCES & COURSES	<p><i>European Geological Union General Assembly</i>, Vienna, Austria (4/2024)</p> <p><i>Research visit</i>, Technische Universität Bergakademie Freiberg, Germany (9/2023)</p> <p><i>Research visit</i>, Oak Ridge National Laboratory, USA (6/2023)</p> <p><i>From holography to machine learning</i>, Workshop, Helsinki, Finland (10/2022)</p> <p><i>EuroStrings</i>, Lyon, France (4/2022)</p> <p><i>Iberian Strings</i>, Gijón, Spain (3/2022)</p> <p><i>Research visit</i>, University of Utrecht, Netherlands (8/2019)</p> <p><i>Elements of AI</i>, Course, University of Helsinki and Reaktor (10/2018)</p> <p><i>Fire and ice: Hot QCD meets cold and dense matter</i>, Workshop, Saariselkä, Finland (4/2018)</p>

Workshop on Holographic dense QCD and neutron stars, École normale supérieure, Paris, France (11/2017)

Black Holes and Emergent Spacetime, Nordita programme, Stockholm, Sweden (8-9/2016)

QCD MasterClass, Saint-Jacut-de-la-Mer, France (6/2016)

The Helsinki Workshop on Quantum Gravity, Helsinki, Finland (6/2016)

Summer school on Mathematical Physics, Lammi, Finland (5/2013)

Summer school on Cosmology, Espoo, Finland (5/2012)

TEACHING The anonymously collected feedback from students ranged from good to excellent. I was awarded as the teaching assistant of the year at Department of Physics, University of Helsinki in 2019 by the students. I was also a member of the teaching committee at the Faculty of Science in University of Helsinki. I completed the university pedagogy courses Yliopistopedagogiikka I & II (2017) with grades 4/5 and 5/5 respectively.

I have taught the following courses:

Lecturer, *University of Helsinki*

Introduction to Mathematica (2020) (intermediate level intensive course)

Teaching assistant, *University of Helsinki*

Mathematical methods for physics IIb (2017 – 2019) (intermediate level course)

Mathematical methods for physics IIa (2016 – 2019) (intermediate level course)

Vuorovaikutukset ja aine (2012) (basic level mechanics course)

CONF. **University of Helsinki**, Faculty of Science.

POSTS Member of the teaching committee (2015 – 2017)

University of Helsinki, Department of Physics.

Member of the Department Council (2014 – 2015)

Oskillaatio – Helsingin yliopiston fysikaalisten tieteiden alumnit ry

Founding member

Member of Board (2024 –)

Association of Doctoral Students at the University of Helsinki

Vice auditor (2017)

Resonanssi ry (organization of physics students)

Vice auditor (2016, 2017, 2018)

Member of Board (2013)

Multiple posts (2012 – 2014)

GRANTS & Postdoctoral research grant, Finnish Academy of Sciences, 34.800e (2022) (declined)

AWARDS Postdoctoral research grant, Finnish Cultural Foundation, 35.000e (2021)

Chancellor's Travel Grant, University of Helsinki 1.450e (2016)

Student grant, The Mathematics and Science Fund, University of Helsinki, 1.000e (2013)

Teaching assistant of the year at the Department of Physics, University of Helsinki (2019)

TALKS *Modeling mechanical stress in freezing soils: sub-Arctic infrastructure, built environment and frost quakes*, EGU General Assembly poster session HS8.3.4, Vienna, Austria, 15.04.2024

On Frost Quakes and sub-Arctic roads: Maintaining Infrastructure in Changing Climate, Oak Ridge National Laboratory, Watershed Systems Modelling Group meeting, Oak Ridge, Tennessee, USA, 08.06.2023

Holographic QCD and neutron stars in the NICER era, Oviedo HEP Theory Seminar, Oviedo, Spain, 21.10.2021

V-QCD and Neutron Stars, Helsinki Institute of Physics Seminar, 2.6.2020

Available online: <https://bit.ly/2B44uSH>

Holographic QCD in the Veneziano limit and neutron stars, Workshop on Holographic dense QCD and neutron stars, École normale supérieure, Paris, France, 23.11.2017

QCD Dynamics via Holography, Doctoral programme in Particle Physics and Universe Sciences meeting, Helsinki, 12.12.2016

QCD Dynamics via Holography, Doctoral programme in Particle Physics and Universe Sciences meeting, Helsinki, 2.12.2015

HOBBIES

Literature, cinema, music and visual arts as either a consumer or a maker. I also dabble in woodworking, paper marbling, analog photography, philosophy and political theory, and multiple sports ranging from cycling to weightlifting and climbing.