

CURRICULUM VITAE

1. Name: Muinonen, Karri Olavi Gender: male Date: 2016 April 27
2. Date of birth: June 28, 1961 Place of birth: Kangasala, Finland
Citizenship: Finland Place of residence: Tuusula, Finland
- 3-4. Degrees: Doctor of philosophy, University of Helsinki, theoretical physics, Sept. 1990
Master of Science, University of Helsinki, theoretical physics, May 1986
Titles of docent: Astronomy, University of Oulu, 1995
Space astronomy, University of Helsinki, 1994
5. Language knowledge: Finnish (mother tongue), English (proficient), Swedish, German
6. Current employment: Professor of Astronomy, University of Helsinki & Finnish Geospatial Research Institute FGI, March 1, 2009- (specializing in Planetary Astronomy & Geodesy); Professor in charge of the Astronomy Curriculum and 29 employees
7. Former employment: Permanent Staff Member (Amanuensis), Observatory, University of Helsinki: Aug. 1992 - Febr. 2009
University Researcher, University of Helsinki: July-Dec. 2007, July-Aug. 2006, Oct.-Dec. 2005, Aug. 2005, Oct. 2004 - March 2005, Aug.-Dec. 2003
Academy Research Fellow, Academy of Finland: May 1998 - July 2003
Visiting Academy Research Fellow, Astronomical Observatory of Torino, Italy: Aug. 2001 - July 2002
Director, Observatory, University of Helsinki: Sept. 1999 - Dec. 2000
Research Scientist, ABB Corporate Research and University of Helsinki: Jan.-Apr. 1998
Special Researcher, University of Helsinki: Jan. 1995 - Dec. 1997
Visiting Special Researcher, Astronomical Observatory, Uppsala University, Sweden: June-Dec. 1997
Research Fellow, University of Pisa: Jan. - June 1996, funded by European Commission Training and Mobility of Researchers network and University of Helsinki
NASA Postdoctoral Fellow, Lowell Observatory, Arizona, U.S.A., Sept. 1990 - Jan. 1993
8. Research funding:
Scattering and Absorption of Electromagnetic Waves in Particulate Media (SAEMPL), ERC Advanced Grant, 2013-2018, 2.75 million euros
Electromagnetic Wave Scattering by Complex Random Media, Acad. Finland, 2012-2016, 420 613 euros (consortium in total: 1.2 million euros)
Light Scattering by Solar-System Small Particles, Acad. Finland, 2009-2012, 500 000 euros
European Leadership in Space Astrometry (ELSA), European Commission Marie Curie Research Training Network (MCRTRN), Participant No. 9, University of Helsinki, 2006-2010, 199 017 euros
Mercury, lunar, and solar science with BepiColombo and SMART-1: X-ray fluorescence from small-particle media, Acad. Finland, 2005-2008, 128 400 euros
Coherent backscattering by complex random media, Acad. Finland (funding for postdoctoral fellow Dr. Evgenij Zubko), 2005-2006, 26 340 euros
Physical and dynamical studies of planetary-system objects, Acad. Finland, 2004-2006, 120 000 euros
Single-particle optical scattering codes for biological warfare agent characterization: ray tracing routines, Battelle, U.S.A., 2004-2005, 50 000 USD
Asteroid and exoplanet orbital inversion and linking problems, Univ. Helsinki, 2003-2005, 100 000 euros
Light scattering by Gaussian random media (Academy Research Fellow -post), Acad. Finland, 1999-2003, 260 000 euros

Light scattering by small particles, asteroids, and comets, Acad. Finland, 2002–2005, 121 000 euros

Interpreting basis for ESA SMART-1/AMIE observations of the Moon with experience from Clementine and Lunar Prospector data analysis, and laboratory and theoretical modeling of light scattering in dusty surfaces, EU/INTAS, 2001–2004, 60 000 euros

Planetary science program, ANTARES, Acad. Finland, 2001–2003, 53 500 euros

Coherent multiple backscattering by inhomogeneous media, Finnish-Ukrainian bilateral researcher exchange, Acad. Finland, 1997-2001, 25 700 euros

Inner-coma interaction of cometary dust, gas, and electromagnetic radiation, Finnish-Russian bilateral researcher exchange, Acad. Finland, 2001, 2 600 euros

Celestial mechanics and scattering theory of near-Earth asteroids and comets, Acad. Finland, 1998, 16 800 euros

Near-Earth asteroids and comets (Special Researcher -post), Univ. Helsinki, 1995–1997, 119 000 euros

Supervision, postdoctoral researchers:

2016-, Anne Virkki (Ph.D. 2016); 2013-, Johannes Markkanen (Ph.D. 2013); 2013, Daniel Guirado (Ph.D. 2013);

2011-2014, Antti Penttilä (Ph.D. 2011); 2007-2013, Mikael Granvik (Ph.D. 2008);

2005-2006, 2009-2013, Evgenij Zubko (Ph.D. 2003)

Supervision, Ph.D. students, appointed by University of Helsinki (13 Ph.D. theses):

2016, Olli Wilkman (Ph.D. thesis under pre-examination); 2016, Anne Virkki; 2013, Hannakaisa Lindqvist (Co-Advisor); 2012, Dagmara Oszkiewicz; 2011, Jani Tyynelä, Antti Penttilä (Co-Advisor); 2009, Jyri Näränen; 2008, Mikael Granvik, Johanna Torppa (Co-Advisor); 2005, Jenni Virtanen; 2003, Sanna Kaasalainen; 2002, Timo Nousiainen; 1998, Jukka Piironen.

Supervision, Ph.D. students, elsewhere (2 Ph.D. theses): 2001, Kari Saarinen, University of Jyväskylä (Co-Advisor); 1998, Johan Lagerros, Uppsala University (Co-Advisor).

Supervision, Ph.Lic. and M.Sc. students: 3 Ph.Lic. and 13 M.Sc. theses 1994-2015, 2 Ph.D. theses and 2 M.Sc. theses under supervision.

Leadership:

Planetary-System Research -group, University of Helsinki, leader, 1998-

ESA Asteroid Impact Mission AIM Asteroid Spectrometer ASPECT, Senior Scientist, Phase A Study, 2015-; EU Cost Action MP1104: Polarimetry as a tool to study the Solar System and beyond, Member of Management Committee, National Coordinator, 2011-2015; Gaia Research for European Astronomy Training (GREAT), National Representative, 2009-2015; Gaia Coordination Unit 4 Solar-System-Object Development Unit DU456 Orbital inversion, Manager, 2005-; BepiColombo MIXS Mercury Imaging X-ray Spectrometer, Co-Principal Investigator, 2004-; Physical and dynamical characterization of near-Earth objects (Nordic Near-Earth-Object Network NEON), Principal Investigator, Nordic Optical Telescope, La Palma, Canary Islands, Spain, 2003-2006; Polarimetric and photometric phase effects of asteroids and transneptunian objects, NASA Outer Planets Research Program, contract NNX10AP93G, Co-Investigator, 2010-; Imaging photometric and polarimetric remote sensing of the Moon, NASA Lunar Advanced Science and Exploration Research Program, contract NNX11AB25G, Co-Investigator, 2010-; Transneptunian Objects: Characterization of Surface Properties, Large Program, ESO Very Large Telescope, Paranal, Chile, Co-Investigator, 2006-2008; BepiColombo SIXS Solar Intensity X-ray and particle Spectrometer, Co-Investigator, 2004-; NESS (Near-Earth Space Surveillance), Member of Science Team, 2002-2007; SMART-1 XSM X-Ray Solar Monitor, Co-Investigator, 1999-; SMART-1 AMIE Panchromatic Camera, Co-Investigator, 1999-; SMART-1 D-CIXS Imaging X-Ray Spectrometer, Co-Investigator, 1998-; Lowell Observatory Near-Earth-Object Search (LONEOS), NASA Research Project, Co-Investigator,

1993-2010

9. Teaching merits:

Professor in charge of Astronomy Curriculum, Dept. Physics, Univ. Helsinki, 2010-
Organizer of seminar series for students in Astronomy (Planetary-System Research), 1998-
Teaching experience at the University of Helsinki (1993-2016): Celestial Mechanics (8 cr;
ten times; subject level in astronomy, also at the Univ. Oulu); Solar System Physics (5
cr; three times; subject level); Planetary Geophysics (5 cr; three times, several lecturers;
subject level in geophysics); Inverse Methods in Astronomy (7 cr; three times, several
lecturers; advanced & postgraduate level); Electromagnetic Radiation Mechanisms (7 cr;
twice; advanced & postgraduate level);
Electromagnetic Scattering I & II (10 cr; eight times; advanced & postgraduate level); Dy-
namics: Advanced Course (7 cr; three times, several lecturers; advanced & postgraduate
level); Asteroids (7 cr; once; advanced & postgraduate level); Space Geodesy: Advanced
Course (5 cr; once; advanced & postgraduate level); Electromagnetic scattering and ab-
sorption (5 cr; once, advanced level).

In the courses, students have been interactively involved in problem-based learning includ-
ing topical presentations with opponents.

10. Scientific awards:

In 1991, asteroid No. 4665 named “Muinonen” in recognition of work on coherent backscat-
tering by small particles and orbital studies of near-Earth objects.

Adjunct Scientist, Lowell Observatory, February 1993–

In 2010, *Journal of Quantitative Spectroscopy and Radiative Transfer* has granted a 50-
Year Milestone Award for “Light scattering by Gaussian random particles: ray optics
approximation” by Muinonen et al. (Ref. 22), placing the article among the four scientif-
ically most significant articles in light scattering in the history of the journal.

11. Other scientific and academic merits:

Opponent in Ph.D.–Dissertations:

2015, Dr. Francois Andriu, Université Paris-Sud; 2012, Dr. Ola Karlsson, Uppsala Uni-
versity; 2007, Dr. Serge Mouret, Paris Observatory; 2004, Dr. Tommy Grav, University
of Oslo; 2002, Dr. Erik Skoglöv, Uppsala University; 2001, Dr. Wang Huining, Helsinki
University of Technology; 1996, Dr. Anssi Toropainen, Helsinki University of Technology.

Reviewer or Committee Member in Ph.D.–Dissertations (year:number): 16:2, 15:2, 14:1,
12:2, 11:1, 10:2, 09:1, 07:1, 05:1, 03:1, 01:2, 94:2

Referee work (years 2015-1992, number of articles):

16:4, 15:4, 14:3, 13:3, 12:5, 11:5, 10:2, 09:2, 08:2, 07:5, 06:7, 05:7, 04:4, 03:7, 02:6, 01:13,
00:7, 99:3, 98:4, 97:7, 96:6, 95:3, 94:4, 93:3, 92:3

Reviewer of Proposals:

U.S. NASA Planetary Geology and Geophysics Program, 2013 and 1999 Review Pan-
els, External Reviewer, 1 review in each; Latvian Science Council, Expert Review, 2013;
Agence Nationale de la Recherche (ANR), France, 2012, External Reviewer, 1 review; Swedish
Space Board, 2009, External Reviewer, 1 review; German Research Foundation DFG 2007,
External Reviewer, 1 review; U.S. NASA Planetary Geology and Geophysics Peer Review
Panel Member, Colorado, U.S.A., 2004, 18 reviews; U.S. NASA Planetary Astronomy Pro-
gram, 1998 Review Panel, External Reviewer, 2 reviews; U.S. NASA Planetary Geology
and Geophysics Program, 1999 and 2013 Review Panels, External Reviewer, 1 review in
each; Italian INAF National Research Projects, 2002 proposals, 1 review

Memberships in Scientific Organizing Committees: 2016: Electromagnetic Theory Sym-
posium, Espoo, Finland, 2016 Aug. 14-18; 2015: 15th Conference on Electromagnetic and
Light Scattering, Leipzig, Germany, 2015 June 22-26; Asteroids IV -book, Space Science
Series; 2014: Chairman, Asteroids, Comets, Meteors, Helsinki, Finland, June 30 - July 4,

2014; 2013: Vice-Chairman, Spectropolarimetric experiments for remote sensing, Kirkkonummi, Finland, 2013 August 19-21; 14th Conference on Electromagnetic and Light Scattering, Lille, France, 2013 June 17-21; 2012: Chairman, Gaia Coordination Unit 4 meeting, May 2011; 2011: Vice-Chairman, Program Committee, Physics Days, Helsinki, Finland, March 2011; 13th Conference on Electromagnetic and Light Scattering, Taormina, Italy, 2011 September 26-30; 2010: Chairman, 12th Conference on Electromagnetic and Light Scattering, University of Helsinki, Finland, 2010 June 28 -July 2; 2008: 11th Conference on Electromagnetic and Light Scattering, University of Hertfordshire, United Kingdom, 2008 September 8-12; 2007: 10th Conference on Electromagnetic and Light Scattering, Bodrum, Turkey, 2007 June 17-22; 2005: 8th Conference on Electromagnetic and Light Scattering, Salobrena, Granada, Spain, 2005 May 16-20; 2004: The Three-Dimensional Universe with Gaia, Paris, 2004 October 4-7 (Member of International Advisory Committee); 2001: Workshop on Collaboration and Coordination among NEO Observers and Orbital Computers, Kurashiki, Okayama, Japan, 2001 Oct. 23-26; 2001: Asteroids III -book, Space Science Series; 2001: Asteroids 2001 -meeting, Palermo, Italy, 2000 June 11-15; 2000: Suomen Avaruustutkijoiden VIII COSPAR-kokous, 2000 Sept. 25-27; 2000: 5th Conference on Electromagnetic and Light Scattering, Halifax, Canada, 2000 Aug. 28 – Sept. 1; 1999: Lähiavaruuden kappaleiden ympäristö- ja turvallisuusriskit (Hazards due to Near-Earth Objects), Helsinki, Finland, 1999 May 11; 1997: International Workshop on Light Scattering by Nonspherical Particles, Helsinki, Finland, 1997 June 9-11; 1996: International Workshop Tunguska'96, Bologna, Italy, 1996 July 15-17.

Memberships in working groups:

ESA Marco Polo Mission, Science Study Team Member, 2007-2010

ESA Gaia, Solar System Working Group, Task Leader on Asteroid Orbit Determination and Prediction, 2001-2005

International Space Station, ESA/ICAPS Topical Team on Interactions between Cosmic and Atmospheric Particle Systems, 1997-

The Spaceguard Survey, NASA International Near-Earth-Object Detection Workshop, 1991-1992.

Positions of trust:

J. Quantitat. Spectrosc. Radiat. Transf., Associate Editor, 2011-; International Astronomical Union, Member 1991-; Secretary of Commission 15 1997-2000; Member of Commission 15 Organizing Committee 2000-2006; Member of Commission 20 Organizing Committee 2006-; Working Group for Near-Earth Objects, Member 1994-2006, 2012-; EuroPlaNet, University-of-Helsinki Information Correspondent, 2007-; The Spaceguard Foundation, Member 1996-; Member of the Board of Directors 1996-2002; Optical Society of America, Member 1987-; Institute of Electrical and Electronics Engineers, Member 1987-; Division for Planetary Sciences, American Astronomical Society, Affiliate Member 1990-; Finnish Physical Society, Member 1984-; Finnish Astronomical Society, Member 1988-, Chairman 1994-1997; Finnish Optical Society, Member 1996-

12. Scientific and societal significance of research:

255 peer-reviewed scientific articles (169 in journals, 86 in edited volumes or conference proceedings). Near-Earth-object (NEO) impact hazard and its mitigation, long-term participation in the analysis of NEO collision probabilities and in the related public outreach, 1990-

13-14. Societal merits and positions of trust, Other merits:

European Space Sciences Committee, European Science Foundation, Member, 2012-