

Dr. John L. Kelley

Curriculum Vitae

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Citizenship U.S.A.

Education

2003 – 2008 Ph.D., physics (combined with master's)
University of Wisconsin, Madison
Madison, Wisconsin, U.S.A.

1995 – 1996 Continuing education in music (conducting)
Duke University
Durham, North Carolina, U.S.A.

1994 – 1995 Graduate program in mathematics
University of California, Los Angeles
Los Angeles, California, U.S.A.

1990 – 1994 B.S., physics and mathematics, *magna cum laude*
Duke University
Durham, North Carolina, U.S.A.

Recent Experience

2009 – present Postdoctoral researcher
Department of Astrophysics, Radboud University Nijmegen
Nijmegen, The Netherlands

2003 – 2008 Graduate research assistant, AMANDA/IceCube group
Department of Physics, University of Wisconsin – Madison
Madison, Wisconsin, U.S.A.

1998 – 2003 Staff engineer, microprocessor design
MIPS Technologies, Inc.
Mountain View, California, U.S.A.

1997 – 1998 Member of technical staff: core design
Silicon Graphics, Inc.
Mountain View, California, U.S.A.

Awards and Grants

2006 United States Antarctica Service Medal
U.S. National Science Foundation

- 2003 Van Vleck Graduate Fellowship
 University of Madison – Wisconsin Department of Physics
- 1994 Julia Dale Memorial Mathematics Award
 Duke University Department of Mathematics

Summary of Scientific Focus

My current research involves the detection and characterization of ultra-high energy cosmic rays and neutrinos via their radio emission in the atmosphere. In previous research, I constrained physics beyond the Standard Model (such as violations of Lorentz invariance) by measuring the high-energy atmospheric neutrino spectrum with the AMANDA-II detector. Additionally, I obtained a limit on the high-energy neutrino flux from the galactic plane, produced from the interaction of cosmic rays with the interstellar medium.

Summary of Technical Skills

In addition to scientific analysis skills such as proficiency in ROOT and Mathematica, I have significant professional experience in microprocessor logic and circuit design, as well as software design for numerous applications. I have programming experience in C, C++, Java, Perl, Python, shell, Verilog, VHDL, Fortran, Pascal, Visual Basic, and MIPS assembler.

Selected Talks

Searching for Quantum Gravity with Ultra-high Energy Neutrinos, invited speaker at Experimental Search for Quantum Gravity 2010, NORDITA, Stockholm, Sweden, 12 July 2010.

The Pierre Auger Observatory: Recent Results and Future Plans, invited speaker at BEYOND 2010, Cape Town, South Africa, 4 February 2010.

A Radio-Frequency Extension to the Pierre Auger Cosmic Ray Observatory, Nederlandse Natuurkundige Vereniging (NNV) Meeting, Lunteren, The Netherlands, 6 November 2009.

Searching for Quantum Gravity with High-energy Atmospheric Neutrinos and AMANDA-II, 18th Particles and Nuclei International Conference (PANIC08), Eilat, Israel, 11 November 2008.

IceRay: An IceCube-centered Radio GZK Array, ARENA 2008 Workshop on Acoustic and Radio EeV Neutrino Detection Activities, Rome, Italy, 24 June 2008.

Testing Violation of Lorentz Invariance with Atmospheric Neutrinos and AMANDA-II, Fourth Meeting on CPT and Lorentz Symmetry, Bloomington, Indiana, 9 August 2007.

Tests of Quantum Gravity with Neutrino Telescopes, invited speaker at workshop “From Quantum to Emergent Gravity: Theory and Phenomenology,” Trieste, Italy, 15 June 2007.

A Search for High-energy Muon Neutrinos from the Galactic Plane with AMANDA-II, 29th International Cosmic Ray Conference, Pune, India, 6 August 2005.

Introduction to the IceCube Detector, IceCube Open House, South Pole, Antarctica, 2 January 2005.

Publications

Refereed Journal Papers

The IceCube Collaboration, R. Abbasi *et al.*, The energy spectrum of atmospheric neutrinos between 2 and 200 TeV with the AMANDA-II detector, *Astroparticle Physics* **34**, 48 (2010), arXiv:1004.2357.

The Pierre Auger Collaboration, J. Abraham *et al.*, Measurement of the Depth of Maximum of Extensive Air Showers above 10^{18} eV, *Physical Review Letters* **104**, 091101 (2010), arXiv:1002.0699.

- The Pierre Auger Collaboration, J. Abraham *et al.*, Measurement of the energy spectrum of cosmic rays above 10^{18} eV using the Pierre Auger Observatory, *Physics Letters B* **685**, 239 (2010), arXiv:1002.1975.
- The Pierre Auger Collaboration, J. Abraham *et al.*, A study of the effect of molecular and aerosol conditions in the atmosphere on air fluorescence measurements at the Pierre Auger Observatory, *Astroparticle Physics* **33**, 108 (2010), arXiv:1002.0366.
- The Pierre Auger Collaboration, J. Abraham *et al.*, Trigger and aperture of the surface detector array of the Pierre Auger Observatory, *Nuclear Instruments and Methods in Physics Research A* **613**, 29 (2010).
- The IceCube Collaboration, R. Abbasi *et al.*, Search for Muon Neutrinos from Gamma-ray Bursts with the IceCube Neutrino Telescope, *Astrophys. J.* **710**, 346 (2010), arXiv:0907.2227.
- The IceCube Collaboration, R. Abbasi *et al.*, Extending the Search for Neutrino Point Sources with IceCube above the Horizon, *Physical Review Letters* **103**, 221102 (2009), arXiv:0911.2338.
- The IceCube Collaboration, R. Abbasi *et al.*, First Neutrino Point-Source Results from the 22 String Icecube Detector, *Astrophys. J.* **701**, L47 (2009), arXiv:0905.2253.
- The IceCube Collaboration, R. Abbasi *et al.*, Search for High-Energy Muon Neutrinos from the "Naked-Eye" GRB 080319B with the IceCube Neutrino Telescope, *Astrophys. J.* **701**, 1721 (2009), arXiv:0902.0131.
- The IceCube Collaboration, R. Abbasi *et al.*, Limits on a Muon Flux from Neutralino Annihilations in the Sun with the IceCube 22-String Detector, *Physical Review Letters* **102**, 201302 (2009), arXiv:0902.2460.
- The IceCube Collaboration, R. Abbasi *et al.*, Determination of the atmospheric neutrino flux and searches for new physics with AMANDA-II, *Phys. Rev. D* **79**, 102005 (2009), arXiv:0902.0675.
- The IceCube Collaboration, R. Abbasi *et al.*, The IceCube data acquisition system: Signal capture, digitization, and timestamping, *Nuclear Instruments and Methods in Physics Research A* **601**, 294 (2009), arXiv:0810.4930.
- The IceCube Collaboration, R. Abbasi *et al.*, Search for point sources of high energy neutrinos with final data from AMANDA-II, *Phys. Rev. D* **79**, 062001 (2009), arXiv:0809.1646.
- The IceCube Collaboration, R. Abbasi *et al.*, Solar Energetic Particle Spectrum on 2006 December 13 Determined by IceTop, *Astrophys. J.* **689**, L65 (2008), arXiv:0810.2034.
- The IceCube Collaboration, M. Ackermann *et al.*, Search for Ultra-High-Energy Neutrinos with AMANDA-II, *Astrophys. J.* **675**, 1014 (2008), arXiv:0711.3022.
- The IceCube Collaboration, A. Achterberg *et al.*, The Search for Muon Neutrinos from Northern Hemisphere Gamma-Ray Bursts with AMANDA, *Astrophys. J.* **674**, 357 (2008), arXiv:0705.1186.
- The IceCube Collaboration, A. Achterberg *et al.*, Multiyear search for a diffuse flux of muon neutrinos with AMANDA-II, *Phys. Rev. D* **76**, 042008 (2007), arXiv:0705.1315.
- The IceCube Collaboration, A. Achterberg *et al.*, Detection of atmospheric muon neutrinos with the IceCube 9-string detector, *Phys. Rev. D* **76**, 027101 (2007), arXiv:0705.1781.
- The IceCube Collaboration, A. Achterberg *et al.*, Search for Neutrino-induced Cascades from Gamma-Ray Bursts with AMANDA, *Astrophys. J.* **664**, 397 (2007), arXiv:astro-ph/0702265.
- The IceCube Collaboration, A. Achterberg *et al.*, Five years of searches for point sources of astrophysical neutrinos with the AMANDA-II neutrino telescope, *Phys. Rev. D* **75**, 102001 (2007), arXiv:astro-ph/0611063.
- The IceCube Collaboration, A. Achterberg *et al.*, Limits on the High-Energy Gamma and Neutrino Fluxes from the SGR 1806-20 Giant Flare of 27 December 2004 with the AMANDA-II Detector, *Physical Review Letters* **97**, 221101 (2006), arXiv:astro-ph/0607233.

- The IceCube Collaboration, A. Achterberg *et al.*, On the selection of AGN neutrino source candidates for a source stacking analysis with neutrino telescopes, *Astroparticle Physics* **26**, 282 (2006), arXiv:astro-ph/0609534.
- The IceCube Collaboration, A. Achterberg *et al.*, First year performance of the IceCube neutrino telescope, *Astroparticle Physics* **26**, 155 (2006), arXiv:astro-ph/0604450.
- The IceCube Collaboration, A. Achterberg *et al.*, Limits on the muon flux from neutralino annihilations at the center of the Earth with AMANDA, *Astroparticle Physics* **26**, 129 (2006).
- The AMANDA Collaboration, The AMANDA Collaboration *et al.*, The IceCube prototype string in AMANDA, *Nuclear Instruments and Methods in Physics Research A* **556**, 169 (2006), arXiv:astro-ph/0601397.
- The AMANDA Collaboration, M. Ackermann *et al.*, Search for extraterrestrial point sources of high energy neutrinos with AMANDA-II using data collected in 2000-2002, *Phys. Rev. D* **71**, 077102 (2005), arXiv:astro-ph/0412347.
- The AMANDA Collaboration, M. Ackermann *et al.*, Flux limits on ultra high energy neutrinos with AMANDA-B10, *Astroparticle Physics* **22**, 339 (2005).
- The AMANDA Collaboration, M. Ackermann *et al.*, Search for neutrino-induced cascades with AMANDA, *Astroparticle Physics* **22**, 127 (2004), arXiv:astro-ph/0405218.

Selected Conference Proceedings

- J. L. Kelley and the IceCube Collaboration, Searching for Quantum Gravity with High Energy Atmospheric Neutrinos and AMANDA-II, *Nuclear Physics A* **827**, 507 (2009).
- P. Allison *et al.*, IceRay: An IceCube-centered radio-Cherenkov GZK neutrino detector, *Nuclear Instruments and Methods in Physics Research A* **604**, 64 (2009), arXiv:0904.1309.
- J. Ahrens, J. L. Kelley, and the IceCube Collaboration, Testing alternative oscillation scenarios with atmospheric neutrinos using AMANDA-II data from 2000 to 2003, *Proc. of the 30th International Cosmic Ray Conference* **5**, 1295 (2008), arXiv:0711.0353.
- J. L. Kelley, Searching for quantum gravity with neutrino telescopes, *Proceedings of Science — From Quantum to Emergent Gravity: Theory and Phenomenology* **022** (2007).
- J. Ahrens, J. L. Kelley, and the IceCube Collaboration, Testing alternative oscillation scenarios with atmospheric neutrinos using AMANDA-II data from 2000 to 2003, in *CPT and Lorentz Symmetry*, edited by V. A. Kostelecký, , *Proc. of the Fourth Meeting Vol. 1*, p. 234, 2007.
- J. L. Kelley and the IceCube Collaboration, Testing Lorentz invariance with atmospheric neutrinos and AMANDA-II, *Proc. of the First Workshop on Exotic Physics with Neutrino Telescopes* (2007), arXiv:astro-ph/0701333.
- G. Battistoni, R. Ganugapati, A. Karle, J. L. Kelley, and T. Montaruli, Comparison of high energy interaction models used for atmospheric shower simulations above 1 TeV, *Journal of Physics Conference Series* **60**, 330 (2007).
- J. L. Kelley and the IceCube Collaboration, A Search for High-energy Muon Neutrinos from the Galactic Plane with AMANDA-II, *Proc. of the 29th International Cosmic Ray Conference* **5**, 127 (2005), arXiv:astro-ph/0509546.
- Y. Ho *et al.*, A Process-Portable 64b Embedded Microprocessor with Graphics Extensions and a 3.6GB/sec Interface , *Proceedings of the 2001 IEEE International Solid-State Circuits Conference* **234** (2001).
- T. Lettieri, J. L. Kelley, and C. Ehrlich, Investigation of annular forces using an oscillating, gas-operated piston gauge, *AIP Conf. Proc.* **309**, 1605 (1994).
- J. L. Kelley and B. A. Ratnam, Damping of Ruchhardt oscillations in closed ended piston gages, *Bulletin of the American Physical Society* **36**, 346 (1991).

Patents

Y. Ho, J. L. Kelley, and X. Jiang, Processor with improved accuracy for multiply-add operations, U.S. patent 7,346,643 (2008).

Y. Ho, M. J. Schulte, and J. L. Kelley, System and method for improving the accuracy of reciprocal square root operations performed by a floating-point unit, U.S. patent 6,912,559 (2005).

J. L. Kelley and Y. Ho, Floating-point processor with improved intermediate result handling, U.S. patent 6,697,832 (2004).

X. Jiang, Y. Ho, and J. L. Kelley, Method and apparatus for predicting floating-point exceptions, U.S. patent 6,631,392 (2003).

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