Jon Erik Urheim

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Physics Department
Indiana University
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Personal

Citizenship: USA
Family: Married, two children (ages 9 and 12)

Education

Ph.D. Physics, 1990 — University of Pennsylvania, Philadelphia PA
Thesis: *Experimental Search for the Decay* $K_L^0 \to \mu e$
Advisor: Prof. W. Molzon

B.S. Physics, 1984 — Massachusetts Institute of Technology, Cambridge MA

Employment

2012 —	Professor of Physics,	Indiana University, Bloomington IN
2006 — 2012	Associate Professor of Physics,	Indiana University, Bloomington IN
2003 — 2006	Assistant Professor of Physics,	Indiana University, Bloomington IN
1999 — 2003	Assistant Professor of Physics,	University of Minnesota, Minneapolis MN
1993 — 1999	Sr. Research Fellow in Physics,	California Institute of Technology, Pasadena CA
1990 — 1993	Millikan Res. Fellow in Physics,	California Institute of Technology, Pasadena CA

Research Interests

- Weak interactions of heavy quarks and leptons
- Neutrino mass and mixing
- Strong interaction physics of hadrons
- Searches for lepton flavor non-conservation and other non-standard-model phenomena
- Topical issues in elementary particle physics, instrumentation, software and data analysis

Awards and Fellowships:

- Award for Outstanding Contributions to Teaching, Physics Dept, Indiana University 2015
- Award for Outstanding Contributions to Teaching, Physics Dept, Indiana University 2011
- Award for Outstanding Contributions to Teaching, Physics Dept, Indiana University 2006
- Robert A. Millikan Research Fellowship in Physics, Caltech 1990–93

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Research Activities

2009 — Member of the DUNE/LBNE collaboration on a neutrino experiment at Fermilab, Batavia IL, and the Sanford Underground Research Facility, Lead SD

- Level 3 Manager for Cryogenics/Cryostat for the LAr Far Dectector ('09 – '10)
- Level 3 Manager for Data Acquisition for the LAr Far Dectector ('10 – '13)
- Co-editor LAr Case Study Report for LBNE ('11 – '12)
- LBNE/DUNE Collaboration Executive Committee ('12 – '14, '16 – '17)
- Co-editor LBNE Science Opportunities Document ('13 – '14)
- LBNE/DUNE Physics Working Group Coordinator ('13 – '16)
- DUNE Authorship and Publications Board ('16 –)
- Co-editor Physics Volume, DUNE Technical Design Report ('17 –)

1999 — Member of collaborations working on the MINOS and NOνA Neutrino Experiments at Fermilab, Batavia IL, and Soudan Underground Laboratory, Soudan MN

- MINOS Offline Computing Coordinator ('99–'06)
- MINOS Executive Committee ('02–'10)
- MINOS Speakers Committee ('03–'06)
- Chair, MINOS Publications Committee ('04–'06)
- Co-convener, MINOS Charged-Current Analysis Group ('06–'09)
- MINOS detector design and construction; analysis software development
- Detector development for $NO\nu A$

1990 — 2004 Member of collaboration working on the CLEO e^+e^- Experiment at the Cornell Electron Storage Ring, Ithaca NY

- Studies of decays of τ leptons, charmed hadrons, and B mesons
- Coordinator of CLEO-II τ lepton physics analysis group ('92–'94, '95–'96, '01–'03)
- Member of Tau/Charm Taskforce for CESR/CLEO at $\sqrt{s} \sim 3$-5 GeV ('00–'01)

1984 — 1990 Collaborated on Alternating Gradient Synchrotron Experiment 791 at Brookhaven National Laboratory, Upton NY

- Construction, commissioning, calibration and operation of the E791 precision drift chamber detector system, associated gas and electronics systems
- Studies of very rare decays of K_L^0 mesons at E791

Sources of External Funding

- Co-Investigator, US Department of Energy Grant DE-FG02-91ER40661, awarded to the Indiana University High Energy Physics group. (The present base funding level is $755,000/year for Task C – Neutrino and Particle Astrophysics, PI's Messier, Mufson, Musser and Urheim.) 2004 – present
- Co-Investigator, US Department of Energy Grant DE-FG02-94ER40823, awarded to the University of Minnesota High Energy Physics group. (By 2003, I was responsible for $\sim \$180,000$ per year from this grant.) 2000 – 2003

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Supervision of Postdoctoral Scientists

- Dr. Gavin Davies — November 2014 – present
- Dr. Hayes Merritt — December 2013 – July 2015
- Dr. Denver Whittington — January 2013 – July 2017
  (Denver is now Asst. Prof. of Physics at Syracuse University)
- Dr. Chad Johnson — June 2010 – August 2012
- Dr. Luke Corwin — January 2009 – August 2013
  (Luke is now Asst. Prof. of Physics at the South Dakota School of Mines & Technology)
- Dr. Masaki Ishitsuka — Spring 2005 – Summer 2009
  (Masaki is currently Associate Professor of Physics at the Tokyo University of Science)
- Dr. David Petyt — Summer 2002 – Summer 2003
  (David is currently Research Scientist at Rutherford Appleton Laboratory, England)
- Dr. Hugh Gallagher — Fall 2000 – Summer 2002
  (Hugh is currently Professor and Chair of Physics at Tufts University)

Supervision of Students

- Bruce Howard (4^{th}-yr. IU Graduate Student – NOvA/DUNE) — Summer 2014 – present
- Bob Armstrong (Ph.D. Indiana U, 2009. – MINOS) — Fall 2004 – Summer 2009
  (Bob is currently Associate Research Scientist at Princeton University)
- Jeremy Gogos (Ph.D. U. MN, 2007 – MINOS) — Summer 2000 – Fall 2007
  (Jeremy is currently working for a financial services company in Minneapolis)
- Ben Speakman (Ph.D. U. MN, 2007 – MINOS) — Summer 2000 – Spring 2007
  (Ben is currently working in industry in the Minneapolis/St. Paul area)
- Bernard Becker (Ph.D. U. MN, 2006 – MINOS) — Summer 2000 – Fall 2005
  (After postdoctoral work at the University of New Mexico, Bernie is working in industry)
- Selina Li (Ph.D. U. MN, 2004 – CLEO) — Summer 2000 – Fall 2004
  (Selina is a research scientist in the Accelerator Research Division at SLAC)
- Six IU Undergraduate Students, various periods between: — Summer 2010 – present
- Five U. MN Undergraduate Students, various periods between: — Spring 2000 – Summer 2003

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Courses Taught

- Phys. P105, Basic Physics of Sound (intro. level) — Spring Sem. 2018
- Phys. P309, Modern Physics Laboratory (sophomore level) — Fall Sem. 2017
- Phys. P105, Basic Physics of Sound (intro. level) — Spring Sem. 2017
- Phys. P309, Modern Physics Laboratory (sophomore level) — Fall Sem. 2016
- Phys. P507, Electricity and Magnetism II (graduate level) — Spring Sem. 2016
- Phys. P506, Electricity and Magnetism I (graduate level) — Fall Sem. 2015
- Phys. P309, Modern Physics Laboratory (sophomore level) — Fall Sem. 2014
- Phys. P309, Modern Physics Laboratory (sophomore level) — Spring Sem. 2014
- Phys. P309, Modern Physics Laboratory (sophomore level) — Fall Sem. 2013
- Phys. P105, Basic Physics of Sound (intro. level) — Spring Sem. 2013
- Phys. P109, Introductory Acoustics Laboratory (intro. level) — Spring Sem. 2013
- Phys. P309, Modern Physics Laboratory (sophomore level) — Fall Sem. 2012
- Phys. P301, Physics III (Modern Physics) (sophomore level) — Spring Sem. 2012
- Phys. P301, Physics III (Modern Physics) (sophomore level) — Spring Sem. 2011
- Phys. P309, Modern Physics Laboratory (sophomore level) — Spring Sem. 2011
- Phys. P400/P540, Analog and Digital Electronics (junior level) — Fall Sem. 2010
- Phys. P309, Modern Physics Laboratory (sophomore level) — Spring Sem. 2010
- Phys. P222, Physics II (E&M + Optics) (freshman level) — Fall Sem. 2009
- Phys. P105, Basic Physics of Sound (intro. level) — Spring Sem. 2009
- Phys. P400/P540, Analog and Digital Electronics (junior level) — Fall Sem. 2008
- Phys. P105, Basic Physics of Sound (intro. level) — Spring Sem. 2008
- Phys. P400/P540, Analog and Digital Electronics (junior level) — Fall Sem. 2007
- Phys. P105, Basic Physics of Sound (intro. level) — Spring Sem. 2007
- Phys. P109, Acoustics Lab. for Hearing and Speech Sciences — Spring Sem. 2007
- Phys. P301, Physics III (Modern Physics) (sophomore level) — Fall Sem. 2006
- Phys. P222, Physics II (E&M + Optics) (intro. level) — Spring Sem. 2006
- Phys. P301, Physics III (Modern Physics) (sophomore level) — Fall Sem. 2005
- Phys. P105, Basic Physics of Sound (intro. level) — Spring Sem. 2005
- Phys. P109, Acoustics Lab. for Hearing and Speech Sciences — Spring Sem. 2005
- Phys. P301, Physics III (Modern Physics) (sophomore level) — Fall Sem. 2004
- Phys. P221, Physics I (Mechanics) (freshman level) — Spring Sem. 2004
- Phys. P222, Physics II (E&M + Optics) (freshman level) — Fall Sem. 2003
- Phys. 4002, Electricity and Magnetism (junior level, at U. MN) — Spring Sem. 2003
- Phys. 4002, Electricity and Magnetism (junior level, at U. MN) — Spring Sem. 2002
- Phys. 4411, Intro. to Particle Physics (sr./1st yr. grad. level, at U. MN) — Spring Sem. 2001
- Phys. 1302, Intro. Phys. for Scientist & Engineers (E&M) (fr. level, at U. MN) — Fall Sem. 2000
- Phys. 4411, Intro. to Particle Physics (sr./1st yr. grad. level, at U. MN) — Spring Sem. 2000

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Recent Departmental Service

- Member, Graduate Curriculum and Exams Committee — August 2015 – present
- Member, Departmental Vision/Self-Study Committee — August 2015 – 2016
- Director, IU Physics Bridge Program — March 2015 – present
- Chair, Diversity Committee — August 2012 – present
- External Awards Committee — August 2012 – 2015
- Faculty Course Assignment Committee — August 2012 – 2015
- Colloquium Committee — August 2012 – present
- Graduate Admissions and Financial Support Committee — August 2011 – 2012
- Faculty/Student/Staff Relations Committee — August 2010 – 2012
- Chair, *ad hoc* Comm. on Executive Committee Representation — October 2009 – May 2010
- IU Physics Department Executive Committee — July 2006 – 2010
- Undergraduate Advisor — Fall 2004 – present
- Undergraduate Curriculum Committee — Fall 2004 – 2012 (Chair, Fall 2007 – Spring 2011)
- Expt'l Particle Physics Faculty Search Committee — Fall 2004 – Spring 2005
- Accelerator Physics Faculty Search Committee — Fall 2003 – Spring 2004
- Graduate Written Exam Committee (U. MN physics dept.) — Fall 2001 – Spring 2003
- Colloquium Committee (U. MN physics dept.) — Fall 2000 – Spring 2002
- Graduate Student Admissions Committee (U. MN physics dept.) — Fall 1999 – Fall 2001
- Facilities Planning Committee (U. MN physics dept.) — Fall 1999 – Fall 2000

Professional Service

- Panelist, DOE OHEP Review of the HEP Progam at Los Alamos National Lab — Apr 2015
  at National Laboratories — May 2013
- Panelist, DOE HEP 2013 Comparative Review – Intensity Frontier Programs
  at National Laboratories — May 2013
- Panelist, DOE HEP 2012 University Comparative Review – Intensity Frontier — Jan 2012
- Panelist, NSERC (Canada) Review of the EXO (Enriched Xenon
  Observatory) Project — Jan 2009
- Member, Fermilab Users Executive Committee — Fall 2008 - Summer 2010
- Panelist, DOE Annual High Energy Physics Program Review
  of the Stanford Linear Accelerator Center — July 2008
- Panelist, Joint NSF/DOE Review of Operations of US ATLAS and US CMS — Feb 2008
- Panelist, Fermilab Director's CD-3b Review of the MINERνA Project — June 2007
- Panelist, Fermilab Director's CD-2/3a Review of the MINERνA Project — Aug 2006
- Panelist, Fermilab Director's Review of Computing for Run II of the Tevatron — Sep 2005
- Panelist, Joint NSF/DOE Review of US LHC Computing Efforts — Mar 2005/Jan 2003
- Technical Reviewer of Univ. Group Research Proposals to DOE & NSF — Fall 2000 – present
- Co-convenor, parallel session *(Hadron Spectroscopy and Exotics)*,
  Int'l. Conference on High Energy Physics, Amsterdam, — July 2002
- Co-convenor, parallel session *(Tests of Standard Model)*,
  Int'l. Conference on High Energy Physics, Warsaw, — July 1996

Memberships in Professional Organizations

- American Physical Society (APS)
- APS Division of Particles and Fields (DPF)
- APS Division of Physics of Beams (DPB)

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Selected Publications in Refereed Journals

1. "Search for the Decays $K_L^0 \to \mu e$ and $K_L^0 \to ee$",
   R. D. Cousins *et al.*, *Physical Review D* **38**, 2914 (1988).

2. "New Experimental Limits on $K_L^0 \to \mu e$ and $K_L^0 \to ee$ Branching Ratios",
   C. Mathiazhagan *et al.*, *Physical Review Letters* **63**, 2181 (1989).

3. "Measurement of the Branching Ratio for the Decay $K_L^0 \to \mu\mu$",
   C. Mathiazhagan *et al.*, *Physical Review Letters* **63**, 2185 (1989).

4. "Higher-statistics Measurement of the Branching Ratio for the Decay $K_L^0 \to \mu\mu$",
   A.P. Heinson *et al.*, *Physical Review D* **44**, R1 (1991).

5. "Measurement of the Tau Lepton Electronic Branching Fraction",
   D.S. Akerib *et al.* (the CLEO Collaboration), *Physical Review Letters* **69**, 3610 (1992);
   Erratum: *Physical Review Letters* **71**, 3395 (1993).

6. "Search for $\tau^- \to \gamma\mu^-$: A Test of Lepton Number Conservation",
   A. Bean *et al.* (the CLEO Collaboration), *Physical Review Letters* **70**, 138 (1993).

7. "Tau Decays with One Charged Particle plus Multiple π^0's",
   M. Procario *et al.* (the CLEO Collaboration), *Physical Review Letters* **70**, 1207 (1993).

8. "Measurement of the τ-Lepton Mass",
   R. Balest *et al.* (the CLEO Collaboration), *Physical Review D* **47**, R3671 (1993).

9. "Limit on the Tau Neutrino Mass",
   D. Cinabro *et al.* (the CLEO Collaboration), *Physical Review Letters* **70**, 3700 (1993).

10. "Measurement of the Decay $\tau^- \to \pi^-\pi^+\pi^- 2\pi^0\nu_\tau$",
    D. Bortoletto *et al.* (the CLEO Collaboration), *Physical Review Letters* **71**, 1791 (1993).

11. "A Measurement of the Branching Fraction $\mathcal{B}(\tau^- \to h^-\pi^0\nu_\tau)$",
    M. Artuso *et al.* (the CLEO Collaboration), *Physical Review Letters* **72**, 3762 (1994).

12. "Two-Photon Production of Charged Pion and Kaon Pairs",
    J. Dominick *et al.* (the CLEO Collaboration), *Physical Review D* **50**, 3027 (1994).

13. "Search for Neutrinoless Decays of the τ Lepton",
    J. Bartelt *et al.* (the CLEO Collaboration), *Physical Review Letters* **73**, 1890 (1994).

14. "Measurement of the Branching Ratio for the Rare Decay $K_L^0 \to \mu\mu$",
    A.P. Heinson *et al.*, *Physical Review D* **51**, 985 (1995).

15. "A Search for $B \to \ell\bar{\nu}_\ell$",
    M. Artuso *et al.* (the CLEO Collaboration), *Physical Review Letters* **75**, 785 (1995).

16. "Measurements of the Decays $\tau^- \to h^-h^+h^-\nu_\tau$ and $\tau^- \to h^-h^+h^-\pi^0\nu_\tau$",
    R. Balest *et al.* (the CLEO Collaboration), *Physical Review Letters* **75**, 3809 (1995).

17. "Measurement of α_s from τ Decays",
    T. Coan *et al.* (the CLEO Collaboration), *Physics Letters* **B356**, 580 (1995).

18. "Tau Decays into Three Charged Leptons and Two Neutrinos",
M.S. Alam *et al.* (the CLEO Collaboration), *Physical Review Letters* **76**, 2637 (1996).

19. "First Observation of the Decay $\tau^- \to K^-\eta\nu_\tau$",
J. Bartelt *et al.* (the CLEO Collaboration), *Physical Review Letters* **76**, 4119 (1996).

20. "Decays of Tau Leptons to Final States Containing K^0_S Mesons",
T.E. Coan *et al.* (the CLEO Collaboration), *Physical Review D* **53**, 6037 (1996).

21. "A Measurement of the Michel Parameters in Leptonic Decays of the Tau",
R. Ammar *et al.* (the CLEO Collaboration), *Physical Review Letters* **78**, 4686 (1997).

22. "Experimental Tests of Lepton Universality in τ Decay",
A. Anastassov *et al.* (the CLEO Collaboration), *Physical Review D* **55**, 2559 (1997).

23. "Determination of the Michel Parameters and the τ Neutrino Helicity in τ Decay",
J.P. Alexander *et al.* (the CLEO Collaboration), *Physical Review D* **56**, 5320 (1997).

24. "First Search for CP Violation in Tau Lepton Decay",
S. Anderson *et al.* (the CLEO Collaboration), *Physical Review Letters* **81**, 3823 (1998).

25. "A Limit on the Mass of the ν_τ",
R. Ammar *et al.* (the CLEO Collaboration), *Physics Letters* **B431**, 209 (1998).

26. "New Limits for Neutrinoless Tau Decays",
D.W. Bliss *et al.* (the CLEO Collaboration), *Physical Review D* **57**, 5903 (1998).

27. "First Observation of the Decay $\tau^- \to K^{*-}\eta\nu_\tau$",
M. Bishai *et al.* (the CLEO Collaboration), *Physical Review Letters* **82**, 281 (1999).

28. "Measurement of Charm Meson Lifetimes",
G. Bonvicini *et al.* (the CLEO Collaboration), *Physical Review Letters* **82**, 4586 (1999).

29. "Study of 3-prong Hadronic τ Decays with Charged Kaons",
S. Richichi *et al.* (the CLEO Collaboration), *Physical Review D* **60**, 112002 (1999).

30. "Observation of Radiative Leptonic Decay of the Tau Lepton",
T. Bergfeld *et al.* (the CLEO Collaboration), *Physical Review Letters* **84**, 830 (2000).

31. "Hadronic Structure in the Decay $\tau^- \to \nu_\tau\pi^-\pi^0\pi^0$ and the Sign of the Tau Neutrino Helicity",
D.M. Asner *et al.* (the CLEO Collaboration), *Physical Review D* **61**, 012002 (2000).

32. "Limit on the Tau Neutrino Mass from $\tau^- \to \pi^-\pi^+\pi^-\pi^0\nu_\tau$",
M. Athanas *et al.* (the CLEO Collaboration), *Physical Review D* **61**, 052002 (2000).

33. "Structure Functions in the Decay $\tau^\mp \to \pi^\mp\pi^0\pi^0\nu_\tau$",
T.E. Browder *et al.* (the CLEO Collaboration), *Physical Review D* **61**, 052004 (2000).

34. "Update of the Search for the Neutrinoless Decay $\tau \to \mu\gamma$",
S. Ahmed *et al.* (the CLEO Collaboration), *Physical Review D* **61**, 071101(R) (2000).

35. "Resonant Structure of $\tau \to 3\pi\pi^0\nu_\tau$ Decays",
K.W. Edwards *et al.* (the CLEO Collaboration), *Physical Review D* **61**, 072003 (2000).

36. "Hadronic Structure in the Decay $\tau^- \to \pi^-\pi^0\nu_\tau$",
S. Anderson *et al.* (the CLEO Collaboration), *Physical Review D* **61**, 112002 (2000).

37. "Search for $D^0\overline{D}^0$ Mixing",
R. Godang *et al.* (the CLEO Collaboration), *Physical Review Letters* **84**, 5038 (2000).

38. "Resonance Structure of $\tau^- \to K^-\pi^+\pi^-\nu_\tau$ Decays",
D. Asner *et al.* (the CLEO Collaboration), *Physical Review D* **62**, 072006 (2000).

39. "First Observation of $B \to D^{(*)}\rho'^-$, $\rho'^- \to \omega\pi^-$",
J.P. Alexander *et al.* (the CLEO Collaboration), *Physical Review D* **64**, 092001 (2001).

40. "Search for CP Violation in $\tau \to \pi\pi^0\nu_\tau$ Decay",
P. Avery *et al.* (the CLEO Collaboration), *Physical Review D* **64**, 092005 (2001).

41. "First Observation of $\overline{B}^0 \to D^{*0}\pi^+\pi^+\pi^-\pi^-$ Decays",
K.W. Edwards *et al.* (the CLEO Collaboration), *Physical Review D* **65**, 012002 (2001).

42. "Search for CP Violation in $\tau \to K\pi\nu_\tau$ Decays",
G. Bonvicini *et al.* (the CLEO Collaboration), *Physical Review Letters* **88**, 111803 (2002).

43. "Improved Measurement of $|V_{ub}|$ with Inclusive Semileptonic B Decays",
A. Bornheim *et al.* (the CLEO Collaboration), *Physical Review Letters* **88**, 231803-1 (2002).

44. "Measurement of the $D^+ \to \bar{K}^{*0}\ell^+\nu_\ell$ Branching Fraction",
G. Brandenburg *et al.* (the CLEO Collaboration), *Physical Review Letters* **89**, 222001 (2002).

45. "Observation of $B \to K^0_S\pi^+\pi^-$ and Evidence for $B \to K^{*\pm}\pi^\mp$",
E. Eckhart *et al.* (the CLEO Collaboration), *Physical Review Letters* **89**, 251801 (2002).

46. "Search for Neutrinoless tau Decays Involving the K^0_S Meson",
S. Chen *et al.* (the CLEO Collaboration), *Physical Review D* **66**, 071101 (2002).

47. "Branching Fractions of tau Leptons to Three Charged Hadrons",
R. A. Briere *et al.* (the CLEO Collaboration), *Physical Review Letters* **90**, 181802 (2003).

48. "Observation of a Narrow Resonance of Mass 2.46 GeV/c^2 Decaying to $D^{*+}_s\pi^0$ and Confirmation of the $D^*_{sJ}(2317)$ State",
D. Besson *et al.* (the CLEO Collaboration), *Physical Review D* **68**, 032002 (2003).

49. "Observation of the Hadronic Transitions $\chi_{b1,2}(2P) \to \omega\Upsilon(1S)$",
D. Cronin-Hennessy *et al.* (the CLEO Collaboration), *Physical Review Letters* **92**, 222002 (2004).

50. "Wess-Zumino Current and the Structure of the Decay $\tau \to K^-K^+\pi^-\nu_\tau$",
T. E. Coan *et al.* (the CLEO Collaboration), *Physical Review Letters* **92**, 232001 (2004).

51. "First Observation and Dalitz Analysis of the $D^0 \to K^0_S\eta\pi^0$ Decay",
P. Rubin *et al.* (the CLEO Collaboration), *Physical Review Letters* **93**, 111801 (2004).

52. "Study of Tau Decays to Four-Hadron Final States with Kaons",
K. Arms *et al.* (the CLEO Collaboration), *Physical Review Letters* **94**, 241802 (2005).

53. "First Observations of Separated Atmospheric ν_μ and $\overline{\nu}_\mu$ Events in the MINOS Detector",
P. Adamson *et al.* (the MINOS Collaboration), *Physical Review D* **73**, 072002 (2006).

54. "Observation of Muon Neutrino Disappearance with the MINOS Detectors and the NuMI Neutrino Beam", D. G. Michael *et al.* (the MINOS Collaboration), *Physical Review Letters* **97**, 191801 (2006).

55. "Charge-separated Atmospheric Neutrino-induced Muons in the MINOS Far Detector", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review D* **75**, 092003 (2007).

56. "Measurement of the Atmospheric Muon Charge Ratio at TeV Energies with the MINOS Detector", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review D* **76**, 052003 (2007).

57. "Measurement of Neutrino Velocity with the MINOS Detectors and the NuMI Neutrino Beam", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review D* **76**, 072005 (2007).

58. "A Study of Muon Neutrino Disappearance Using the Fermilab Main Injector Neutrino Beam", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review D* **77**, 072002 (2008).

59. "Measurement of neutrino oscillations with the MINOS detectors in the NuMI beam", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **101**, 131802 (2008).

60. "Testing Lorentz invariance and CPT conservation with NuMI neutrinos in the MINOS near detector," P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **101**, 151601 (2008).

61. "The magnetized steel and scintillator calorimeters of the MINOS experiment," D.G. Michael *et al.* (the MINOS Collaboration), *Nucl. Instrum. Meth. A* **596** 190 (2008).

62. "Search for active neutrino disappearance using neutral-current interactions in the MINOS long-baseline experiment," P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **101**, 221804 (2008).

63. "Search for muon-neutrino to electron-neutrino transitions in MINOS," P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **103**, 261802 (2009).

64. "Search for sterile neutrino mixing in the MINOS long baseline experiment," P. Adamson *et al.* (the MINOS Collaboration), *Physical Review D* **81**, 052004 (2010).

65. "New constraints on muon-neutrino to electron-neutrino transitions in MINOS," P. Adamson *et al.* (the MINOS Collaboration), *Physical Review D* **82**, 051102(R) (2010).

66. "Search for Lorentz Invariance and CPT Violation with the MINOS Far Detector," P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **105**, 151601 (2010).

67. " Measurement of Neutrino Mass Splitting and Flavor Mixing by MINOS," P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **106**, 181801 (2011).

68. "Active to Sterile Neutrino Mixing Limits from Neutral Current Interactions in MINOS", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **107**, 011802 (2011).

69. "First Direct Observation of Muon Antineutrino Disappearance", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **107**, 021801 (2011).

70. "Search for Lorentz Invariance and CPT Violation with Muon Antineutrinos in the MINOS Near Detector", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review D* **85**, 031101 (2012).

71. "Improved Measurement of Muon Antineutrino Disappearance in MINOS", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **108**, 191801 (2012).

72. "Measurements of Atmospheric Neutrinos and Antineutrinos in the MINOS Far Detector", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review D* **86**, 052007 (2012).

73. "Measurement of Neutrino and Antineutrino Oscillations Using Beam and Atmospheric Data in MINOS", P. Adamson *et al.* (the MINOS Collaboration), *Physical Review Letters* **110**, 215801 (2013).

74. "Liquid Argon Time Projection Chamber Research and Development in the United States", B. Baller *et al. Journal of Instrumentation* **9**, T05005 (2014).

75. "Measurement of the Neutrino Mixing Angle θ_{23} in NOvA", P. Adamson *et al.* (the NOvA Collaboration), *Physical Review Letters* **118**, 151802 (2017).

76. "Constraints on Oscillation Parameters from ν_e Appearance and ν_μ Disappearance in NOvA", P. Adamson *et al.* (the NOvA Collaboration), *Physical Review Letters* **118**, 231801 (2017).

Authorship and Editorial Work for Selected Reports Posted on arXiv

1. "Liquid Argon Case Study for LBNE", 106 pages, LBNE-doc-3600, (2011); http://lbne2-docdb.fnal.gov/cgi-bin/ShowDocument?docid=3600; co-editor, with B. Baller (Fermilab) and B. Fleming (Yale), and co-author with the LBNE Science Collaboration.

2. "Project X: Physics Opportunities", A. S. Kronfeld and R. S. Tschirhart (eds.), arXiv:1306.5009 [hep-ex], (2013).

3. "The Long-Baseline Neutrino Experiment: Exploring Fundamental Symmetries of the Universe", C. Adams *et al.*, 205 pages, arXiv:1307.7335 [hep-ex], (v1:2013, v3:2014); co-editor, with M. Bishai (Brookhaven), A. Heavey (Fermilab) and B. Viren (Brookhaven), and co-author with the LBNE Science Collaboration.

4. "Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) Conceptual Design Report Volume 2: The Physics Program for DUNE at LBNF", R. Acciarri *et al.*, 127 pages, arXiv:1512.06148 [physics.ins-det], 2015.

5. "Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) Conceptual Design Report Volume 4: The DUNE Detectors at LBNF", R. Acciarri *et al.*, arXiv:1601.02984 [physics.ins-det], 2016.

6. "Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) Conceptual Design Report Volume 1: The LBNF and DUNE Projects", R. Acciarri *et al.*, arXiv:1601.05471 [physics.ins-det], 2016.

Jon Erik Urheim

Publications in Conference Proceedings

1. "Search for $K_L^0 \to \mu e$ at BNL E791", Jon Urheim, in *'89 Electroweak Interactions and Unified Theories*, edited by J. Tran Thanh Van, (Editions Frontieres, Gif-sur-Yvette, 1989), p. 375.

2. "One-Prong Tau Decays with Multiple π^0's", Jon Urheim, in *Proceedings of the Second Workshop on Tau Lepton Physics*, September 1992, edited by K.K. Gan, (World Scientific, 1993).

3. "Recent Results in Tau Physics from CLEO-II", Jon Urheim, in *'94 Electroweak Interactions and Unified Theories*, edited by J. Tran Thanh Van, (Editions Frontieres, Gif-sur-Yvette, 1994), 561.

4. "New Results from CLEO-II on Hadronic Decays of the Tau Lepton", Jon Urheim, in *Proceedings of the Eighth Meeting of the Division of Particles and Fields of the American Physical Society*, edited by Sally Seidel (World Scientific, 1995), 619.

5. "The Hadronic Current in Tau Lepton Decay to Two Pseudoscalar Mesons", Jon Urheim, in *Tau 96: Proceedings of the Fourth Workshop on Tau Lepton Physics*, edited by J.G. Smith and W. Toki, *Nuclear Physics B* (Proc. Suppl.) **55C**, 359 (1997).

6. "Tau Physics: Recent Past, Foreseeable Future", Jon Urheim, in *Proceedings of the Seventh International Symposium on Heavy Flavor Physics*, C. Campagnari, ed. (World Scientific, 1999), 290.

7. "$|V_{ub}|$, $|V_{cb}|$ and $b \to s\gamma$ at CLEO", Jon Urheim, in *Proceedings of the Fifth International Conference on Hyperons, Charm and Beauty Hadrons*, C. S. Kalman *et al.*, ed., (Elsevier, 2002), 201.

8. "Status of the MINOS Experiment, and Review of Long Baseline Neutrino Experiments in Europe and North America", Jon Urheim, in *Proceedings of the XXXI International Conference on High Energy Physics*, J. Koch *et al.*, eds. (Elsevier, 2002).

9. "Observation of the $D_{sJ}(2463)$ and Confirmation of the $D_{sJ}^*(2317)$", Jon Urheim and Sheldon Stone, in *Proceedings of the VIII Conference on the Intersections of Particle and Nuclear Physics*, Z. Parsa and W. J. Marciano, eds. (American Institute of Physics, 2003), and in *Proceedings of the Second International Conference on Flavor Physics and CP Violation*, P. Perret, eds., (eConf C030603, 2003).

10. "Rare Decays of Tau Leptons: an Experimental Review", Jon Urheim, in *Proceedings of the VIII Conference on the Intersections of Particle and Nuclear Physics*, Z. Parsa and W. J. Marciano, eds. (American Institute of Physics, 2003), and in *Proceedings of the Second International Conference on Flavor Physics and CP Violation*, P. Perret, ed., (eConf C030603, 2003).

Jon Erik Urheim

Presentations at Conferences

1. Invited Presentation, *Search for $K_L^0 \to \mu e$ at BNL E791*,
   Rencontres de Moriond, Electroweak Session, Les Arcs France, March 1989.
2. Invited Presentation, *Recent Results on Tau Physics from CLEO*,
   General Meeting of the American Physical Society, Washington D.C., April 1991.
3. Contributed Talk, *One-Prong Tau Decays with Multiple π^0's*,
   General Meeting of the American Physical Society, Washington D.C., April 1992.
4. Invited Presentation, *One-Prong Tau Decays with Multiple π^0's*,
   2nd Int'l Workshop on Tau Lepton Physics, Columbus OH, June 1992.
5. Invited Presentation, *Recent Results on Tau Physics from CLEO-II*,
   Rencontres de Moriond, Electroweak Session, Meribel France, March 1994.
6. Invited Presentation, *Results on Semihadronic Tau Decays from CLEO-II*,
   Meeting of the Division of Particles and Fields of the APS, Albuquerque NM, August 1994.
7. Invited Presentation, *Results on Semihadronic Tau Decays from CLEO-II*,
   Aspen Winter Conference on Particle Physics, Aspen CO, January 1996.
8. Contributed Presentation, *Results on Two-Photon Physics from CLEO-II*,
   XXVIII Int'l Conference on High Energy Physics, Warsaw, Poland, July 1996.
9. Invited Presentation, *The Hadronic Current in Tau Lepton Decay to Two Pseudoscalar Mesons*,
   4th Int'l Workshop on Tau Lepton Physics, Boulder CO, September 1996.
10. Invited Presentation, *Tau Physics: Recent Past, Foreseeable Future*,
    7th Int'l Symposium on Heavy Flavor Physics, Santa Barbara CA, July 1997.
11. Invited Presentation, *New Results on Tau Neutrino Mass from CLEO*,
    Meeting of the Division of Particles and Fields of the APS, Los Angeles CA, January 1999.
12. Invited Presentation, *Long Baseline Neutrino Oscillation Experiments*,
    Orbis Scientiae Conf. on High Energy Physics, Ft. Lauderdale FL, December 1999.
13. Invited Presentation, *Review of Hadronic Tau Lepton Decays*,
    Conference on the Intersections between Particle and Nuclear Physics,
    Quebec City Canada, May 2000.
14. Contributed Presentation, *Hadronic Structure in $\tau^- \to \pi^-\pi^+\pi^-\nu_\tau$ at CLEO*,
    Meeting of the APS Division of Particles and Fields, Williamsburg VA, May 2002.
15. Invited Presentation, *$|V_{ub}|$, $|V_{cb}|$ and $b \to s\gamma$ at CLEO*,
    Fifth Int'l Conference on Hyperons, Charm and Beauty Hadrons,
    Vancouver Canada, June 2002.
16. Invited Presentation, *Status of MINOS and Review of Long Baseline Neutrino Experiments in Europe and North America*,
    XXXI Int'l Conference on High Energy Physics, Amsterdam, The Netherlands, July 2002.

17. Invited Presentation, *Observation of the $D_{sJ}(2463)$ and Confirmation of the $D^*_{sJ}(2317)$ at CLEO*,
VIII Conference on the Intersections of Particle and Nuclear Physics, New York NY, May 2003.

18. Invited Presentation, *Rare Decays of Tau Leptons, an Experimental Review*,
VIII Conference on the Intersections of Particle and Nuclear Physics, New York NY, May 2003.

19. Invited Presentation, *The MINOS Experiment*,
127^{th} National Meeting of the American Association of Physics Teachers, Madison WI, August 2003.

20. Invited Presentation, *Status of the MINOS Experiment*,
2005 Aspen Winter Conference: The Highest Energy Physics, Aspen CO, February 2005,
http://conferences.fnal.gov/aspen05/.

21. Invited Presentation, *Beam and Large Detectors for the LBNE Project*,
11^{th} International Workshop on Next Generation Nucleon Decay and Neutrino Detectors, Toyama, Japan, December 2010, http://www-sk.icrr.u-tokyo.ac.jp/NNN10/.

22. Contributed Presentation, *Status of the Long-Baseline Neutrino Experiment LBNE*,
Meeting of the Division of Particles and Fields of the American Physical Society, Providence, RI, August 2011, http://www.hep.brown.edu/∼DPF2011/ .

23. Invited Presentation, *LBNE, The Long-Baseline Neutrino Experiment: Status and Outlook* ,
IceCube Particle Astrophysics Symposium, Madison, WI, May 2013,
http://wipac.wisc.edu/meetings/home/IPA2013 .

24. Panelist, *Colloquium: Neutrino mass, mixing and Grand Unification: Tough Questions Panel*
CSS 2013, Snowmass on the Mississippi, Minneapolis, MN, July 2013,
http://www.hep.umn.edu/css2013/ .

25. Invited Presentation, *LBNE, The Long-Baseline Neutrino Experiment: Status and Outlook* ,
XVI Lomonosov Conference on Elementary Particle Physics, Moscow, Russian Federation,
August 2013, http://www.icas.ru/english/LomCon/16lomcon/16lomcon_programme.htm .

26. Invited Presentation, *DUNE: Status and Prospects*,
XXVII International Conference on Neutrino Physics & Astrophysics, London,
July 2016, http://neutrino2016.iopconfs.org/ .

27. Invited Presentation, *DUNE: Status and Prospects*,
Tamura Symposium on Lepton and Baryon Symmetry, University of Texas, Austin,
May 2017, http://www.hep.utexas.edu/Tamura2017/ .

Jon Erik Urheim

Seminars and Colloquia

1. Harvard University, high energy physics seminar, May 1988
2. Yale University, high energy physics seminar, May 1989
3. California Institute of Technology, high energy physics seminar, Apr. 1989
4. California Institute of Technology, high energy physics seminar, May 1991
5. California Institute of Technology, physics department colloquium, Feb. 1992
6. Stanford University, physics department colloquium, Feb. 1992
7. Stanford Linear Accelerator Center, high energy physics seminar, Feb. 1992
8. University of California, Irvine, high energy physics seminar, Apr. 1992
9. Cornell University, high energy physics seminar, Sep. 1993
10. California Institute of Technology, high energy physics seminar, May 1993
11. California Institute of Technology, high energy physics seminar, Apr. 1994
12. Stanford Linear Accelerator Center, high energy physics seminar, Mar. 1995
13. University of California, Irvine, high energy physics seminar, Apr. 1995
14. California Institute of Technology, high energy physics seminar, Jan. 1996
15. Brookhaven National Laboratory, high energy physics seminar, Jan. 1996
16. University of California, Los Angeles, high energy physics seminar, Sep. 1996
17. University of California, San Diego, high energy physics seminar, Oct. 1996
18. University of Minnesota, high energy physics seminar, Jun. 1996
19. Fermi National Accelerator Lab, high energy physics seminar, Feb. 1997
20. Massachusetts Institute of Technology, high energy physics seminar, Feb. 1997
21. Harvard University, high energy physics seminar, Feb. 1997
22. Boston University, high energy physics seminar, Feb. 1997
23. University of Michigan, high energy physics seminar, Feb. 1997
24. University of California, Santa Barbara, high energy physics seminar, Apr. 1997
25. Harvard University, high energy physics seminar, Jan. 1998
26. Brown University, high energy physics seminar, Feb. 1998
27. College of William and Mary, physics department colloquium, Mar. 1998
28. Thomas Jefferson National Accelerator Facility, seminar, Mar. 1998
29. University of Massachusetts, high energy physics seminar, Apr. 1998
30. Duke University, high energy physics seminar, Apr. 1998
31. Duke University, physics department colloquium, Apr. 1998
32. Carnegie-Mellon University, high energy physics seminar, Oct. 1998
33. University of Minnesota, high energy physics seminar, Jan. 1999
34. University of Minnesota, physics department colloquium, Dec. 1999
35. Princeton University, high energy physics seminar, Nov. 2000
36. University of Minnesota, high energy physics seminar, Jan. 2001
37. University of Pennsylvania, high energy physics seminar, Feb. 2001
38. Cornell University, high energy physics seminar, Mar. 2001
39. University of Illinois, high energy physics seminar, Oct. 2001
40. University of Cambridge, high energy physics seminar, Oct. 2001
41. Southern Methodist University, high energy physics seminar, Nov. 2002
42. Argonne National Laboratory, high energy physics seminar, Dec. 2002

43. College of William and Mary, physics department colloquium, Mar. 2003
44. Indiana University, high energy physics seminar, Apr. 2003
45. Indiana University, high energy physics seminar, Sep. 2003
46. University of Louisville, physics department colloquium, Oct. 2003
47. University of Notre Dame, high energy physics seminar, Dec. 2005
48. The Ohio State University, physics department colloquium, Nov. 2006
49. The University of Colorado, high energy physics seminar, Jul. 2007
50. The University of Illinois, high energy physics seminar, Sep. 2010
51. Indiana University, high energy physics seminar, Jan. 2011
52. University of California, Irvine, high energy physics seminar, June 2011
53. Indiana University, physics department colloquium, Sep. 2011
54. University of California, Irvine, physics department colloquium, Oct. 2011
55. Universita di Pavia, high energy physics seminar, June 2013
56. Cornell University, high energy physics seminar, May 2014
57. University of Michigan, high energy physics seminar, Dec. 2017

Jon Erik Urheim

Summary of Most Significant Papers (1989-2017)

- *New Experimental Limits on $K_L^0 \to \mu e$ and $K_L^0 \to ee$ Branching Ratios*,
  C. Mathiazhagan *et al.*, Phys. Rev. Lett. **63** (1989), 2181.
  Measurement of the Branching Ratio for the Decay $K_L^0 \to \mu\mu$,
  C. Mathiazhagan *et al.*, Phys. Rev. Lett. **63** (1989), 2185.

  These papers reported results of my thesis experiment: BNL E791. At the time, these comprised:
  (1) the most stringent upper limit on the rate for the decay $K_L \to \mu e$, and consequently was among the most sensitive searches for lepton-flavor violation; **(2)** the most precise measurement of the highly suppressed flavor-changing weak neutral current process $K_L \to \mu\mu$, which, barring theoretical uncertainties, can be used to determine the product of poorly known parameters of the CKM quark mixing matrix V_{ts} and V_{td}.

- *Tau Decays with One Charged Particle plus Multiple π^0's*,
  M. Procario *et al.*, Phys. Rev. Lett. **70** (1993), 1207;
  A Measurement of the Branching Fraction $\mathcal{B}(\tau^- \to h^-\pi^0\nu_\tau)$,
  M. Artuso *et al.*, Phys. Rev. Lett. **72** (1994), 3762.

  The results presented here were among the first measurements of τ lepton decays into final states containing neutral pions with high statistics and careful control over systematic errors, using the high-precision CLEO-II CsI(Tl) crystal calorimeter to reconstruct photons from π^0 decay. The values obtained were significantly higher than those from earlier measurements, thus providing the resolution to a longstanding inconsistency in τ decay data that was variously (and erroneously) interpreted as a possible sign of new (non standard-model) physics. First observation of the decay $\tau^- \to \pi^- 4\pi^0\nu$. *These articles have been cited in 48 and 45 records, respectively, according to SPIRES.*

- *Decays of Tau Leptons to Final States Containing K_S^0 Mesons*,
  T. E. Coan *et al.*, Phys. Rev. D **53** (1996), 6037.

  First detailed study of τ lepton decays to final states containing one or two kaons, addressing issues pertaining to $SU(3)_{flavor}$ symmetry violations, chiral perturbation theory, and strange meson spectroscopy and decay dynamics. First observation of the decay $\tau^- \to K_S^0 K_S^0 \pi^-\nu$ and demonstration of its potential use in constraining the mass of the ν_τ. *This article has been cited in 41 records according to SPIRES.*

- *Hadronic Structure in the Decay $\tau^- \to \nu_\tau\pi^-\pi^0\pi^0$ and the Sign of the Tau Neutrino Helicity*,
  D. Asner *et al.*, Phys. Rev. D **61** (2000), 012002.

  Detailed examination of light axial-vector mesons in τ lepton decay, revealing rich and complicated structure only hinted at by previous experiments. First definitive indications of decay channels $a_1 \to \sigma\pi$, $f_0(1370)\pi$ and $f_2(1270)\pi$, as well as indirect evidence for $a_1 \to K^*K$. Results on $\tau \to a_1'\nu$ have implications for ν_τ mass measurements using the $\tau \to 3\pi\nu$ decay mode. *This article has been cited in 160 records according to SPIRES.*

- *Hadronic Structure in the Decay $\tau^- \to \pi^-\pi^0\nu_\tau$*,
  S. Anderson *et al.*, Phys. Rev. D **61** (2000), 112002.

  Detailed, high-statistics, analysis of the dominant τ decay channel in the context of models for weak production of $\rho(770)$, $\rho(1450)$ and $\rho(1700)$ resonances. Precise measurement of $\rho(770)$ resonance parameters. Model-independent comparisons with data on $e^+e^- \to \pi^+\pi^-$ provides experimental test of the Conserved Vector Current (CVC) theorem for weak/electromagnetic interactions. Elucidation of significance of deviations between e^+e^- and τ decay data. Application of data to infer hadronic vacuum-polarization radiative corrections needed to interpret data from the Brookhaven Exp. 821 measurement of the muon anomalous magnetic moment which shows a possible deviation from the Standard Model prediction. *This article has been cited in 196 records according to SPIRES.*

- *Observation of a Narrow Resonance of Mass 2.46 GeV/c^2 Decaying to $D_s^{*+}\pi^0$ and Confirmation of the $D_{sJ}^*(2317)$ State*,
D. Besson *et al.*, Phys. Rev. D **68** (2003), 032002.

  Presentation of evidence confirming the existence of an unexpected narrow resonance, the $D_{s0}^*(2317)$, discovered by the BaBar Collaboration in April 2003. Established the existence of a second narrow state, the $D_{s1}(2460)$, with similar properties to the $D_{s0}^*(2317)$. The existence and properties of the $D_{s1}(2460)$ support models that exploit heavy quark and chiral symmetries and predict a "parity doubling" in which the two new states are explained as positive-parity chiral partners of well-known states of negative parity, the $D_s(1969)$ and the $D_s^*(2112)$. *This article has been cited in 569 records according to SPIRES.*

- *Measurement of neutrino oscillations with the MINOS detectors in the NuMI beam*,
P. Adamson *et al.*, Phys. Rev. Lett. **101** (2008), 131802.
Measurement of Neutrino Mass Splitting and Flavor Mixing by MINOS,
P. Adamson *et al.*, Phys. Rev. Lett. **106** (2011), 181801.

  Results from beam data taking by the MINOS Experiment, supporting the hypothesis of neutrino oscillations as the explanation for the ν_μ deficit observed by underground detectors studying atmospheric neutrinos. The measurements of the oscillation parameter Δm_{32}^2 at the time gave the world's most precise value for this quantity, superseded only by subsequent MINOS results. *These articles have been cited in 463 and 314 records, respectively, according to SPIRES.*

- *The Long-Baseline Neutrino Experiment: Exploring Fundamental Symmetries of the Universe*,
C. Adams *et al.*, arXiv:1307:7335 (v1:2013, v3:2014).

  This 200-page report serves as a comprehensive reference for the physics opportunities and capabilities of the proposed LBNE experiment, as understood at the time of its writing. It was written in part to provide input to the U.S. particle physics program planning process that was undertaken in 2013 and 2014, and is addressed to a broad range of readership ranging from experts in the field to governmental science policy entities. *This document has been cited in 361 records according to SPIRES.*