

# Allena K. Opper

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## Education and Employment:

- 2001-present: Associate Professor, Physics Department, Ohio University.
- 1995-2001: Assistant Professor, Physics Department, Ohio University.
- 1991-1995: Postdoctoral Research Associate, University of Alberta.
- 1991: Ph.D., Experimental Nuclear Physics, Indiana University.
- 1983: BSc, Engineering Physics, Colorado School of Mines, Golden, CO, USA.

**Research Support:** Federal and State career total (includes multi-investigator grants)  
\$2,608,142 US, \$111,800 Canadian. Grants within the last five years:

- 2003 - 2006: National Science Foundation: \$1,117,085; one of three Co-PI's  
Nucleon Structure Through Electron and Photon Scattering
- 2003 - 2006: National Science Foundation: \$31,657: Co-PI  
Collaborative Research: Development of a Particle Tracking  
System for the  $Q_{weak}$  Experiment  
Major Research Instrumentation Grant (total = \$590,727)
- 2002 - 2004: Ohio University 1804 Award: \$35,000; Co-PI  
A Collaborative Initiative in Neutrino Physics
- 2000 - 2003: National Science Foundation: \$1,030,090; includes 2 REU awards,  
one of three Co-PI's  
Probing Nucleon Structure and the Nucleon-Nucleon Force
- 2000 - 2001: National Science Foundation: \$37,345: Principal Investigator  
POWRE: Measurement of the Electric and Magnetic Form Factors  
of the Neutron
- 1997 - 2000: National Science Foundation: \$287,400; includes 2 REU awards,  
Principal Investigator  
A High Precision Measurement of Charge Symmetry Breaking in the  
N-N Interaction
- 1997 - 1999: Ohio University 1804 Award: \$19,000; Co-PI  
Collaborative Research with the Research Center for Nuclear Physics  
at Osaka (Japan) University

## Research Appointments and Awards:

- 2001: Review panel for NSF intermediate energy physics
- 1999: Mentor of HL Mosbacher; Grasselli Undergraduate Research Award
- 1998: Review panel for NSF POWRE proposals
- 1998: Review panel for NSF CAREER proposals
- 1996: Mentor of RT Waters; Grasselli Undergraduate Research Award

### Academic Appointments (Ohio University):

- 2002 - 2003: Senior Academic Advisor to Undergraduate Students in department
- 2000 - 2003: University Curriculum Council, Individual Course Committee
- 1997 - 2003: Department Undergraduate Recruitment Committee Chair
- 1998 - 2002: Department Graduate Curriculum Committee Chair

### Professional Society Membership:

- 2003 - present: Member of National Nuclear Physics Summer School Committee, American Physical Society
- 2002 - present: Member of the  $Q_{weak}$  Collaboration at the Thomas Jefferson National Accelerator Facility.
- 1998 - 2002: Member of the CLAS Collaboration at the Thomas Jefferson National Accelerator Facility.
- 1978 - present: American Physical Society, Nuclear Physics Division.

**Publications:** Over 40 published/submitted in refereed physics journals. Five invited talks published in edited conference proceedings. The 5 most relevant recent publications are:

1. G. Warren, *et al.* (The E93-026 Collaboration), **Measurement of the Electric Form Factor of the Neutron at  $Q^2 = 0.5$  and  $1.0 \text{ GeV}^2/c^2$ .** Accepted by Physical Review Letters, e-Print Archive: hep-ex/0308021.
2. S. Stepanyan, *et al.* (The CLAS Collaboration), **Observation of an exotic  $S = +1$  baryon in exclusive photoproduction from the deuteron.** Phys. Rev. Lett. **91**, 252001 (2003).
3. **A.K. Opper**, E. Korkmaz, D.A. Hutcheon, R. Abegg, C.A. Davis, R.M. Finlay, P.W. Green, L.G. Greeniaus, D.V. Jordan, J.A. Niskanen, G.V. O’Rielly, T.A. Porcelli, S.D. Reitzner, P.L. Walden, and S. Yen. **A precision measurement of charge symmetry breaking in  $np \rightarrow d\pi^0$ .** Phys. Rev. Lett. **91**, 212302 (2003).
4. R. Madey, *et al.* (The E93-038 Collaboration), **Measurements of  $G_E^n/G_M^n$  from the  $^2\text{H}(\vec{e}, e')\vec{n}$  Reaction to  $Q^2 = 1.45 \text{ (GeV}/c)^2$ .** Phys. Rev. Lett. **91**, 122002 (2003).
5. D.A. Hutcheon, R. Abegg, E.G. Auld, R.M. Churchman, C.A. Davis, R.M. Finlay, P.W. Green, L.G. Greeniaus, R. Henderson, K.H. Hicks, D.V. Jordan, W. Kellner, E. Korkmaz, **A.K. Opper**, G.V. O’Rielly, T.P. Porcelli, S.D. Reitzner, G. Sheffer, P.L. Walden, and S. Yen. **Apparatus for a Measurement of Charge Symmetry Breaking in  $np \rightarrow d\pi^0$ .** Nuclear Instruments and Methods **A459**, pp 448 - 458 (2001).

## Research Activities and Interests:

Experimental studies in subatomic and few body physics exploiting polarization phenomena and fundamental symmetries to investigate manifestations of quark effects and the substructure of the nucleon. Fourty-two publications in peer reviewed journals.

- A precision test of the Standard Model through a few percent measurement of the weak charge of the proton; the Jefferson Lab  $Q_{weak}$  experiment. This measurement will provide a 0.3% measurement of the weak mixing angle at low  $Q^2$ , which is far from the  $Z^0$  pole and will severely constrain the  $Q^2$  running of the weak mixing angle. I am responsible for the trigger scintillators which are critical for the calibration measurements.
- Measurement of the electric form factor of the neutron and the proton from  $d(\vec{e}, e'\vec{n})p$  and  $p(\vec{e}, e'\vec{p})$  to determine the charge structure of the nucleon,  $G_E^n$  and  $G_E^p$ , respectively. I am supervising a PhD student who is extracting  $G_E^p$  data from E93-038 at Jefferson Lab.
- A precision measurement of charge symmetry breaking in nucleon–nucleon interactions: measurement of the forward–backward asymmetry in  $np \rightarrow d\pi^0$  near threshold (**cospokesperson**, E704), at TRIUMF. This experiment is an investigation of contributions to charge symmetry breaking that are predicted to be strong for this reaction and not accessible in others. Charge symmetry breaking is ultimately due to the mass difference between the  $u$  and  $d$  quarks and electromagnetic contributions. This work has been highlighted in the popular and physics media (e.g. Physics World, CERN Courier, Physics Today, and Science News); please see <http://www.phy.ohiou.edu/~opper/> for links to these and other popular references. I supervised one graduate student who earned her PhD from this work; nine undergraduate summer students participated in this experiment.

## Graduate and Undergraduate Student Supervision:

- 1999 - present: G MacLachlan, graduate student; PhD expected 2004,  $G_E^p$  (JLab E93-038).
- 1997 - 2002: SD Reitzner, graduate student; PhD 2002, Charge Symmetry Breaking in  $np \rightarrow d\pi^0$  Close to Threshold; Currently a research associate at OSU.
- 2001: J Brower, NSF REU, summer and winter; JLab E93-038.
- 2000: S Calhoun, NSF REU, summer; TRIUMF.
- 1999: J Sheehan, undergraduate student, summer; TRIUMF.
- 1998: M Krejny, undergraduate student, summer; TRIUMF.
- 1996 - 1999: HL Mosbacker, NSF REU; JLab Hall B; awarded The Grasselli Annual Undergraduate Research Award.
- 1995 - 1997: RT Waters, undergraduate student; JLab Hall B; awarded The Grasselli Annual Undergraduate Research Award.

### Teaching Experience at Ohio University:

- **Graduate Courses:** PHYS 696, Journal Club for graduate students in nuclear physics; PHYS 553, Introduction to Nuclear Physics; PHYS 726 and 727, Particles and Nuclei.
- **Undergraduate Courses:** PHYS 210, Seminar for first year physics majors; PHYS 372, Intermediate lab for physics majors (photons); PHYS 373, Intermediate lab for physics majors (nucleons); PHYS 453, Nuclear Physics; PHYS 201 and 202, Introductory physics for non-physics majors (algebra based); PHYS 105, a course on wave phenomena for non-science majors (Color, Light and Sound).

### Participation in Outreach and Various University Committees:

- Outreach
  - Organized and led tours of the Edwards Accelerator Facility at Ohio University for visiting groups including the Athens Association for Gifted Children. 1996 through the present.
  - Participated in the Women in Science and Engineering Program at Ohio University with a talk titled “Exploring the Subatomic World – how and why.” 1998, 1999, 2000, 2001, 2002, 2003.
  - Gave guest lectures on Nuclear Physics at a local high school and a local middle school. 1998
  - Collaborated with local high school teacher to coach students for the Regional Physics Olympiad. 1997
- Departmental Service
  - Undergraduate Recruiting Committee, Chair
  - Undergraduate Academic Advisor, senior advisor
  - Graduate Curriculum Committee, Chair
  - Colloquium Committee
  - Library Committee
  - Intermediate Labs Committee
  - Search Committees for faculty positions: 98/99 experimental nuclear physics, 99/00 astrophysics, 00/01 nuclear astrophysics.
  - Organized informal monthly lunches for female undergraduate and graduate students in the department.
- University Service
  - General Education Committee
  - Individual Course Committee

- University Curriculum Council
- Participated in recruitment activities for the College of Arts and Sciences.
- Mentored a student in the Honors Tutorial College at Ohio University.
- Advise undergraduate students with no declared major.
- Community Service
  - Referee for peer review journals (PRL, PRC).
  - Participated on a panel to review NSF experimental intermediate energy proposals, 2001.
  - Member of the TRIUMF Users' Executive Committee, Jan 2000 to 2002.
  - Participated on the organizing committee for American Physical Society Workshop on Soft QCD, 1998.
  - Participated on a panel to review NSF POWRE proposals, 1998.
  - Participated on a panel to review NSF CAREER proposals, 1998.