

# Philip Lawrence Cole

## Professor of Experimental Nuclear Physics

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### I. Professional Preparation

#### a) **Education**

<u>Institution (date)</u>	<u>Field of Study</u>	<u>Degree</u>
Purdue University (1991)	Physics	PhD
Purdue University (1986)	Physics	MS
Cornell University (1983)	Physics	BA

#### b) **Education for Professional Development**

Idaho State University Fall 2007: Spanish 201. Spring 2008: Spanish 202. I enrolled in undergraduate Intermediate Spanish courses at Idaho State University as a freshman.

#### c) **Employment** (in reverse chronological order)

<u>Place</u>	<u>Position/Title</u>	<u>Time Period</u>
Idaho State University Pocatello, Idaho	Professor	2013 – present
Idaho State University Pocatello, Idaho	Associate Professor	2004 – 2013
Jefferson Lab Newport News, Virginia	Hall-B Sabbatical Professor	2003 – 2004
University of Texas at El Paso El Paso, Texas	JLab-Bridge Assistant Professor	1997 – 2004
George Washington University Washington, DC	Assistant Research Professor	1995 – 1997
Commissariat à l'Énergie Atomique Gif sur Yvette, France	Visiting Scientist	4/1995 – 6/1995
Istituto Nazionale di Fisica Nucleare Genoa, Italy	Visiting Scientist	1/1995 – 4/1995
George Washington University Washington, DC	Postdoctoral Researcher	9/1991 – 8/1995

### II. Teaching

#### a) **Courses Taught**

- **Undergraduate Level**

- General Physics I (Introductory /Algebra-based) taught: 4x
- Engineering Physics I (Introductory Classical Mechanics) taught: 7x
- Engineering Physics II (Introductory Electricity and Magnetism) taught: 7x

- Intermediate Classical Mechanics taught: 6x
- Intermediate Quantum Mechanics I taught: 2x
- Intermediate Quantum Mechanics II taught: 2x
- **Graduate Level**
  - Classical Mechanics taught: 1x
  - Mathematical Methods for Physicists taught: 4x
  - Introduction to Particle Physics taught: 4x
  - Quantum Mechanics I taught: 1x
  - Quantum Mechanics II taught: 3x
  - Graduate Student Seminar on Scientific Presentations taught: 6x
  - Electronics Lab taught: 1x
- b) Teaching Awards and Distinctions**
  - 2004 – 2005 Who's Who Among American Teachers (Idaho State University)
  - 2003 – 2004 Who's Who Among American Teachers (University of Texas at El Paso)
  - 2003 Russell Mammei and Juliette Mammei were each awarded an NSF Graduate Research Fellowship. Only two were awarded in Nuclear Physics in 2003. P.L. Cole was their advisor at the University of Texas at El Paso <http://www.nsf.gov/pubs/2011/nsf11582/nsf11582.htm>
  - 2002 Society of Physics Students Outstanding Faculty Advisor in the Nation (700 chapters nationally) <http://www.spsnational.org/programs/awards/2002/ocaa.htm>
- c) New Programs Developed**
  - **Applied Physics PhD.** I played a key role in developing the PhD program in Applied Physics at Idaho State University, which began in 2005/2006.
  - **Student Recruitment.** I have developed a program to recruit students from Colombia through several NSF grants, which has enabled me to travel to Colombia. I have also been an organizer of the Latin American Symposium for Nuclear Physics and Applications since 1999, which serves to help with networking in South America. And I took Spanish 201/202.
- d) Thesis Advisor**
  - Master's:
    - Alejandro Puga (2001) *Calibration of the UTEP/Orsay instrumented collimator via the LabVIEW-based data acquisition system*
    - Jennifer Farley (2006) *Measuring the 20.2-ms half life of the 472-keV line from the isomer Na-24m with pulsed photons at the Idaho Accelerator Center*
    - Adrienne Spilker (2009) *Optical Restoration of Damaged Lead Fluoride Crystals*
    - Mayir Mamtimin (2012) *Feasibility Study of Photon Activation Analysis on Airborne Particulates, Volcanic Ash, and Moon Dust Samples*
  - PhD:
    - Julián Salamanca (2009) *The Photoproduction of  $\phi$ -Mesons off Protons by Using a Beam of Linearly Polarized Photons at Threshold Energies*
    - Charles Taylor (2012)  *$K_S$  Lambda Photoproduction on the Neutron within the Resonance Region*
    - Olga Cortés (in progress) *Photoproduction of  $\omega$ -Mesons off Neutrons with Linearly Polarized Photons*
    - Danny Martinez (in progress) *Photoproduction of  $\omega$ -Mesons off Protons with Linearly Polarized Photons*
- e) Dissertation Committees** (PhD: 4 and Master's: 17)

### III. Research and Creative Activity

#### a) Publications

##### 1. Conference Proceedings (Co-Editor)

- VII Latin American Symposium on Nuclear Physics and Applications, Cusco, Peru, 11-16 June 2007, *AIP Conf. Proc.* 947, Editors: Ricardo Alarcon, Philip L. Cole, Chaden Djalali, and Fernando Umeres.
- VIII Latin American Symposium on Nuclear Physics and Applications, Santiago, Chile, 15-19 December 2009, *AIP Conf. Proc.* 1265, Editors: Ricardo Alarcon, Hugo F. Arellano, Philip L. Cole, and Andres Kreiner.

##### 2. Refereed Articles (*A complete list of Philip L. Cole's papers can be found on INSPIRE, the High Energy Physics information system:* <<http://inspirehep.net/author/P.L.Cole.2/>>)

- **with the CLAS Collaboration** (126 publications)  
<http://www.jlab.org/Hall-B/shifts/index.php?display=utils&task=publications>  
[For the full list since 2000 click on the above link. I have been a Full Member of the CLAS collaboration since 1996. Limited Member (1991-1996). The experiment started taking data in 1997. There are approximately 150 collaborators.]

#### *Papers*

The links below are to the HEP literature site *INSPIRES*, which is useful for finding papers published in Phys. Rev. C, Phys. Rev. D, Phys. Rev. Lett., Phys. Lett. B, Z. Phys., Nucl. Instr. and Meth., etc.

##### **CLAS** (Hall B of Jefferson Lab):

- Articles published in journals: 114  
[http://inspirehep.net/search?ln=en&ln=en&p=find+a+cole+and+cn+clas&action\\_search=Search&sf=&so=d&rm=&rg=100&sc=1&of=hb](http://inspirehep.net/search?ln=en&ln=en&p=find+a+cole+and+cn+clas&action_search=Search&sf=&so=d&rm=&rg=100&sc=1&of=hb)
- AIP Conference Proceedings (lead author): 6  
[http://inspirehep.net/search?ln=en&p=philip+cole+aip&of=hb&action\\_search=Search](http://inspirehep.net/search?ln=en&p=philip+cole+aip&of=hb&action_search=Search)
- Other Conference Proceedings (lead author): >10

##### **E735** (Fermilab) [graduate student]:

- Articles published in journals: 7  
[http://inspirehep.net/search?ln=en&ln=en&p=find+a+cole+and+cn+e735&action\\_search=Search&sf=&so=d&rm=&rg=100&sc=1&of=hb](http://inspirehep.net/search?ln=en&ln=en&p=find+a+cole+and+cn+e735&action_search=Search&sf=&so=d&rm=&rg=100&sc=1&of=hb)
- Conference Proceedings (lead author): 1

##### **Idaho Accelerator Center:**

- Refereed articles in Conference Proceedings: 4

#### b) Experimental Proposals

I am actively engaged in experimental nuclear physics research at Jefferson Lab. The focus of my physics research is the nature of the strong force as mediated by the quark subdegrees of freedom in the nucleon, how nucleons and quanta of light interact by the types of particles they exchange, and the nature of how quarks change mass at different distance scales. I am a Co-Spokesperson on four CLAS experiments, three with the 6-GeV CLAS and the other one with the

12-GeV upgraded configuration of the CLAS detector at Jefferson Lab. My group is also actively involved in the analysis of the g13 data run, on which I am not a spokesperson. The CEBAF Large Acceptance Spectrometer (CLAS) collaboration is an international group of scientists who participate and collaborate in experiments carried out with the CLAS detector in Hall B of Jefferson Lab. The CLAS collaboration represents more than 60 institutions and 26 countries.

**6 GeV** See <<https://www.jlab.org/experimental-hallB>>

**g8** (gamma experiment #8) linearly polarized photons onto protons

- **E-94-109** Philip Cole (Idaho State University) and Ken Livingston (Glasgow University). *Photoproduction of the Rho Meson from the Proton with Linearly Polarized Photons*
- **E-98-109** Philip Cole (Idaho State University) and David Tedeschi (University of South Carolina). *Photoproduction of phi Mesons with Linearly Polarized Photons* (This was the PhD thesis experiment for **Julian Salamanca**, Advisor: P.L. Cole.)
- **E-99-013** Philip Cole (Idaho State University) and Franz Klein (Catholic University of America). *Photoproduction of omega mesons off protons with linearly polarized photons* (This is the PhD thesis experiment for **Danny Martinez**, in progress, Advisor: P.L. Cole.)

**g13** (gamma experiment #13) linearly and circularly polarized photons onto deuterium.

My group is also participating in the analysis of the g13 run at Jefferson Lab, which took data in the fall and spring of 2007. I have three students, whose thesis projects are from this data.

- **Olga Cortes** *Photoproduction of omega Mesons off Neutrons with Linearly Polarized Photons*
- **Charles Taylor**  *$K_S^0$  Photoproduction on the Neutron within the Resonance Region.* (PhD: December 2012)

**12 GeV** (See <[http://wwwold.jlab.org/exp\\_prog/generated/12GeV/hallb.html](http://wwwold.jlab.org/exp_prog/generated/12GeV/hallb.html)>)

- **E12-09-003** Volker Burkert (Jefferson Lab), Philip Cole (Idaho State University), Ralf Gothe (University of South Carolina), Kyungseon Joo (University of Connecticut), Victor Mokeev (Moscow State University & Jefferson Lab), and Paul Stoler (Rensselaer Polytechnic Institute). *Nucleon Resonance Studies with CLAS12* (approved Feb. 2009; expected to run: 2017).

c) **Patent** Remote Sensing Device to Detect Materials of Varying Atomic Numbers, United States Patent, Patent No: US 7,599,463 B2, Oct 6, 2009 <http://www.freepatentsonline.com/7599463.pdf>

d) **External Grants** Only external grants awarded are listed. I have received 4 internal grants. And I have submitted 15 additional external grants, which have not been awarded.

[All grants delineated below were refereed.]

• **NSF Grants Awarded:**

- *Probing the Weak and Strong Nature of the Nucleon*, NSF, \$900,000 (Awarded: August 1, 2013) [PI: Philip Cole, Co-PIs: Tony Forest, Mahbub Khandaker, and Dustin McNulty.]
- *Electromagnetic Probes of Hadronic Matter*, NSF, Amount requested: \$1,530,990 (Awarded, but funded for one year only, August 1, 2012 to July 31, 2013, for the amount \$269,999) [PI: Dustin McNulty, Co-PIs: Philip Cole, Daniel Dale, and Tony Forest]
- *Program to Study Hadronic Matter using Electromagnetic Probes at Jefferson Lab*, \$962,211 (Awarded: September 14, 2009) [PI: Tony Forest, Co-PIs: Philip Cole and Daniel Dale]

- *US-Peru Workshop in Nuclear Physics and Its Applications, June 11-16, 2007, Cusco, Peru, \$32,200 (Awarded: Jan 19, 2007) [PI: Chaden Djalali, Co-PI: Philip Cole]*
  - *Probing for  $N^*$ s with Linearly Polarized Photons in Hall B of JLab, \$270,000 (Awarded: June 16, 2006) [PI: Philip Cole]*
  - *U.S.-Argentina Collaborative Workshop in Nuclear Physics and Its Applications, \$32,200 (Awarded: September 1, 2005) [PI: Chaden Djalali, Co-PI: Philip Cole]*
  - *The Coherent BREMS Project: Baryon Resonance and Exotic Meson Search, \$30,000 (Awarded: June 22, 2005) [PI: Philip Cole]*
  - *US-Brazil Student Sponsorship at the Fifth Latin American Symposium on Nuclear Physics, Santos, Brazil, September 1-5, 2003, \$18,000 (Awarded: Aug 16, 2003) [PI: Philip Cole, Co-PI: Jorge Lopez]*
  - *Americas Program: Student Sponsorship at the Fourth Latin American Symposium on Nuclear Physics, Mexico City, Mexico, September 24-28, 2001, \$23,369 (Awarded: September 5, 2001) [PI: Philip Cole]*
  - *A Collaborative Effort between the United States and Colombia on the Research with Linearly-Polarized Photons, \$32,590 (Awarded: May 14, 2001) [PI: Philip Cole]*
  - *Photoproduction of Vector Mesons (supplemental), \$15,294 (Awarded: January 29, 2001) [PI: Philip Cole]*
  - *Student Sponsorship Program at the Third Latin American Workshop on Nuclear and Heavy Ion Physics, San Andres, Colombia, September 13-17, 1999, \$10,000 (Awarded: July 1999) [PI: Philip Cole]*
  - *Photoproduction of Vector Mesons – NSF CAREER AWARD, \$390,294 (Awarded: April 30, 1999) [PI: Philip Cole]*
- **DOE Contract Awarded:**
    - *Construction of R1 Drift Chambers for Hall B, \$735,653. Memorandum of Understanding with Jefferson Lab. (Dates: 6/1/11-6/1/13) [Tony Forest, Dustin McNulty, Philip Cole, and Daniel Dale]*
- e) **Talks (since 2006)** [Given in Argentina, Chile, P.R. China, Colombia, Ecuador, France, Germany, Italy, Mexico, Peru, Russia, Spain, and the U.S.]
- Conferences Invited (Plenary: 11 & Parallel: 12), Contributed: 10, and Posters: 3
  - Colloquia and Seminars (>25)
- f) **Honors**
- Fulbright Scholar Program. Grant is for research/teaching at the Physics Institute of the University of Bonn for the period of Sept. 16, 2014 to Jan. 15, 2015.
  - NSF CAREER AWARD for Nuclear Physics (1999)  
(see: [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=503214](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214))
  - GEORGE W. TAUTFEST AWARD for student showing outstanding promise in particle physics, Purdue University (1991).

## IV. Service

### a) Service to Discipline

- Accelerator Applications Division (AAD) of the American Nuclear Society (ANS) <http://aad.ans.org/index.html> Treasurer (2008–2009), Secretary (2009–2010), Vice Chair (2010-2011), Chair (2011–2012), and Past Chair (2012–2013). I was elected to the position of Vice Chair again (2013-2014) and I will be the Chair (2014-2015).
- Idaho State University Representative (since 2009) to the Southeastern Universities Research Association (SURA), the body that oversees Jefferson Lab. Idaho State University is the most distant member and I initiated membership as an affiliate member.
- Member of the JLab Users Board of Directors (2009-2011)
- Organizer for Several Conferences
  - Topic Editor for Nuclear-Based Analysis at CAARI (2010, and 2012)
  - International Topical Meeting on Nuclear Applications of Accelerators (AccApp)
    - AccApp'07 (Pocatello, Idaho) Technical Program Chair
    - AccApp'09 (Vienna, Austria). One of five consultants to the International Atomic Energy Agency for organizing this conference
    - AccApp'11 (Knoxville, Tennessee.) Technical Program Committee Co-Chair.
    - AccApp'13 (Bruges, Belgium) General Co-Chair. I represented the American Nuclear Society for the American side. <http://www.accapp13.org/>
    - AccApp'15 (Chicago, Illinois) General Chair
  - Latin American Symposium for Nuclear Physics and Applications (LASNPA)
- Sessions Chaired at Conferences (>15) since 2004
- Standing Reviewer for the NSF (including CAREER proposals)
- Reviewed 1 U.S. Civilian Research and Development Foundation (CRDF) proposal
- NSF Panel Member for the Advanced Research Initiative. (Homeland Security).
- NSF Panel Member for International Research Experiences for Students
- Standing Reviewer of Grant Proposals for Colombia, the Czech Republic, and Italy.

### b) Professional Organizations

- American Physical Society (since 1984)
- Full Member of the CLAS Collaboration (since 1996)
- American Nuclear Society (since 2006)

### c) Service to Idaho State University

- Faculty Senate (2008 – 2012)
  - Physical Sciences Representative (2008 – 2009)
  - Vice Chair (2009 – 2010)
  - Chair (2010 – 2012)
- Search Committee for the Dean of the College of Arts and Sciences (spring 2007)
- Several Departmental Search Committees
- Accelerator Safety Committee [Member (2004 – 2009) and Chair (2007 – 2009)]
- Physics PhD Qualifying Committee [Member (2006 – present) and Chair (2010 – 2012)]