



**BALL STATE
UNIVERSITY**

May 12, 2020

Material Licensing Section
U.S. Nuclear Regulatory Commission
Region III
2443 Warrenville Road
Suite 210
Lisle, IL 60532-4352

Dear Sir/Madam:

We wish to request an amendment to Ball State University's NRC material license. Our license number is 13-06231-01. The requested amendment and justification are given below.

The amendment becomes necessary due to the planned retirement of Dr. Clare Chatot, the University's present Chairperson of the Radiation Safety Committee (RSC). Upon recommendation from University administration and the Radiation Safety Committee, Dr. David Grosnick, Professor of Physics and Astronomy has been selected as Chairperson of the RSC to replace Dr. Chatot, effective July 1, 2020. We seek your approval of Dr. David Grosnick as Chairperson of the RSC. Dr. Grosnick specializes in experimental high-energy physics and experimental nuclear physics, has been a member of the Radiation Safety Committee since 2003, and is an authorized user of radioactive material at Ball State University. Dr. Grosnick's CV is attached.

Sincerely,

Susan McDowell
Vice Provost for Research
Professor of Biology

Academic Affairs

Vice Provost for Research

Muncie, Indiana 47306-0155 | Phone: 765-285-8846 | Fax: 765-285-1624

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Curriculum Vitae

David P. Grosnick
Professor
Department of Physics and Astronomy
Ball State University
Muncie, IN 47306

EDUCATION

Degree	Date	University	Major(s)
Ph.D.	1986	University of Chicago	Physics
M.S.	1979	University of Chicago	Physics
B.A. with Distinction	1977	Valparaiso University	Physics, Mathematics

PROFESSIONAL EMPLOYMENT

2013-Present: **Professor, Ball State University**

2005-2013: **Associate Professor, Ball State University**

1999-2005: **Assistant Professor, Ball State University**

1996-Present: **Research Associate and Visiting Professor, Valparaiso University**

Participation in particle-physics experimental programs at Brookhaven National Laboratory on spin effects of particles at high energy and baryon spectroscopy.

1997-1999: **Visiting Assistant Professor, Purdue University North Central**
Taught undergraduate astronomy, physics, and mathematics

1995-1997: **Part-time Assistant Professor, Valparaiso University**
Taught undergraduate introductory physics laboratory and mathematics

Guest Lecturer, Purdue University North Central
Taught undergraduate astronomy, physics, and mathematics

Professional employment (continued)

- 1989-1995: **Assistant Physicist, High-Energy Physics Division, Argonne National Laboratory**
Performed high-energy and medium-energy physics research on the spin effects of polarized beams and targets for experiments run at Brookhaven National Laboratory, Fermi National Accelerator Laboratory, and CEN-Saclay, France; Supervisor in the Undergraduate Research Participant Program and in the Faculty Research Participation Program
- 1986-1989: **Post-doctoral Appointee, High-Energy Physics Division, Argonne National Laboratory**
Performed high-energy and medium-energy physics research on the spin effects of polarized beams and targets for experiments run at Fermi National Accelerator Laboratory and Los Alamos Meson Physics Facility; Supervisor in the Undergraduate Research Participant Program and in the Faculty Research Participation Program
- 1987: **Part-time Assistant Professor, Valparaiso University**
Taught undergraduate introductory physics laboratory
- 1979-1986: **Research Assistant, University of Chicago**
Participated in particle physics experiments attempting to observe extremely rare decay modes of muons and pions that would violate conservation laws.
- 1977- 1981: **Teaching Assistant, University of Chicago**
Taught undergraduate physics labs, led discussion groups
Honor: Finalist for Gregor Wentzel Prize for outstanding first-year graduate teaching assistant

FIELDS OF PROFESSIONAL SPECIALIZATION

Experimental high-energy physics: spin effects of particles using high-energy polarized beams and targets

Experimental nuclear physics: spin effects of the nucleon-nucleon interaction; baryon spectroscopy; and search for the quark-gluon plasma using heavy-ion collisions at high energy

Physics education: introductory physics course development; participation in PhysTEC and PhysTEC Noyce programs

TEACHING

Member of Ball State University Graduate Faculty

1999 – 2000: Graduate Faculty Level IV

2000 – Present: Graduate Faculty Level I (Full and Doctoral Chair)

Courses Taught at Ball State University:

Introductory Astronomy; Conceptual Physics; Introductory Algebra-Based Physics (both semesters); Problem-Solving for Introductory Algebra-Based Physics; Introductory Calculus-Based Physics (first semester); Modern Physics Laboratory; Mechanics; Optics; Electricity & Magnetism (both semesters); Nuclear Physics; Nuclear Techniques; Elementary Particles; Career Issues in Physics; Measures of Learning in Physics; Seminar in Physics

Note: The upper-level courses are dual-level undergraduate and graduate courses

Courses Taught at Purdue University – North Central:

Introductory Calculus-Based Physics; Introductory Physics for Technology Students; Introductory Astronomy (both semesters); Remedial Algebra; College Algebra

Courses Taught at Valparaiso University:

Introductory Calculus-Based Physics Laboratory; Finite Mathematics

Thesis/dissertation committee membership

Chairperson of committee for Master's Degree:

2020 Tyler Mix Particle Physics

2012 Malorie Stowe Particle Physics

Thesis: "Initial Performance Studies of the Forward GEM Tracker."

2010 Joshua Kellams Particle Physics

Thesis: "An Analysis of Zero Degree Calorimeter Shower Maximum Detector Data for Polarimetry at STAR."

2005 Christopher McClain Particle Physics

Thesis: "Testing the Shower Maximum Detector in the Endcap Electromagnetic Calorimeter at STAR Using Monte Carlo Simulations."

Member of committee for Master's Degree:

2020 Bishal Thapa Computational Physics

2020 Aswad Alhassan Medical Physics

Thesis/dissertation committee membership (continued)

2019	Cameron Gray	Astronomy
2109	Nicholas Gilliam	Medical Physics
2017	Lillie Robinson	Medical Physics
2017	Maha Alossiami	Medical Physics
2016	Dylan Griffith	Astronomy
2016	Michael Holcomb	Astronomy
2016	Andrew Lerman	Astronomy
2014	Jesse Watson	Computational Physics
2014	Kent Bayens	Medical Physics
2013	Kevin Shane	Materials Physics
2012	Zach Nault	Computational Physics
2012	Imendra Ranatunga	Medical Physics
2012	Vide Dede Teye	Medical Physics
2012	Dayna Thompson	Astronomy
2011	Earl Wood	Astronomy
2011	Michael Gross	Astronomy
2008	Jeffrey Gritton	Astronomy
2007	Elliott Gruszka	Medical Physics
2007	Randall Hamper	Astronomy
2007	Carina Poltera	Biophysics
2005	Richard James De Boer	Nuclear Physics
2004	Frederick Welsh	Astronomy
2003	Robert Greene	Nuclear Physics
2001	Richard Maupin	Astronomy
2000	Ahmed Alkhalifah	Particle Physics

Member of committee for Doctor of Education Degree:

2011	Dennis McClure	Astronomy
2007	Robert Hill	Astronomy

Research paper/creative project advisor**Advisor for Honors Thesis:**

2020	Kenzie Worsham	Physics Instrumentation
2014	Samuel McClellan	Physics Education
Title: "On Physicists of Significance, But Less Public Presence."		
2007	Melissa Bitters	Particle Physics
Title: "Analysis of STAR ZDC SMD Data for Polarimetry."		
2005	Colleen Dupuis	Physics of Gymnastics
Title: "Physics of Gymnastics."		

Research paper/creative project advisor (continued)

Advisor for Research Paper/Creative Project for Master's Degree:

2006 Aaron Debbink Physics Education

Title: "Analysis of the CSEM: A Standardized Testing Instrument for Introductory Physics Classes and the Development of Curricular Material for Class Improvement."

Research paper/creative project advisor

Advisor for Research Paper/Creative Project for Bachelor's Degree:

2020 Kyle Koeller Optical Pumping experiment

2016 John Keesling Particle Physics

Title: "An Inexpensive Cosmic Ray Detector."

Development of course materials

2000 – present - Revision of introductory physics laboratory experiments and incorporated the lab manuals for algebra-based (PHYCS 110, 112) and calculus-based (120) courses.

Incorporated presentations on physics of toys, professional ethics, and career and professional opportunities and requirements for PHYCS 115, Fall 2017.

Revised laboratory on digital circuits, "How Digital Circuits Work," for PHYCS 112, Spring 2016.

Developed over 60 pencasts, audio and visual materials that aid in problem-solving skills, of a variety of problems for PHYCS 110 and 111, Fall 2015.

Incorporated new addition to laboratory on measurements, "Measurements, Uncertainty, and Experimental Error," for PHYCS 110, Fall 2015.

Revised laboratory on friction, "Friction: The Ever-Present Force," for PHYCS 110, Fall 2014.

Developed new laboratory on magnetism, "Mapping Magnetic Fields," for the lab part of PHYCS 112, Fall 2010.

Developed new laboratory on kinematics, "Motion in Two Dimensions – Projectiles," for PHYCS 120, Fall 2007.

Incorporated new laboratory on momentum and collisions, "Collisions in One- and Two Dimensions," for PHYCS 110, Fall 2006.

Developed new laboratory on electricity, "Mapping Electric Fields," for PHYCS 112, Spring 2006.

Assisted Teacher-in-Residence in producing personal response system (PRS "clicker") questions for PHYCS 110 and 112 laboratories to provide further practice in student conceptual concept learning. Fall 2006.

Development of course materials (continued)

Revised motion laboratories with newer computer-based technology in the labs to analyze motion, such as making a video clip of an object's motion, analyze it using computer software, and then use a computer spreadsheet to further analyze the motion and graph the results. Work was accomplished with assistance from two Teachers-in-Residence from the PhysTEC program. Fall 2003.

2000 – present - Revision of modern physics laboratory, PHYCS 262, experiments

2000 – present - Revision of modern physics laboratory, PHYCS 262, experiments

Revised laboratory on the Cavendish experiment developed for PHYCS 262, Spring 2019.

Revised laboratory on the photoelectric effect developed for PHYCS 262, Spring 2015; updated 2018.

Revised laboratory on the measurement of the speed of light developed for PHYCS 262, Spring 2008.

Developed new laboratory on superconductivity, "An Experiment to Observe Superconductivity at Liquid-Nitrogen Temperatures," for PHYCS 262, Spring 2007.

Developed new laboratory on measuring fundamental constants, "An Experiment to Measure e/k ," for PHYCS 262, Spring 2007.

Revised laboratory on radiation that incorporates a measurement of the lifetime of cosmic-ray muons, developed for PHYCS 262, Spring 2006.

Fall 2017 – Acquired large cloud chamber from donor funds for use with lecture demonstrations and public outreach in the planetarium.

Spring 2014 – A proposal for a new UCC-21 (Core Curriculum) Tier 2 course, ASTR 126, "Black Holes, Dark Matter, and the Universe," was written and approved by the Department and college committees. This course is intended to explore the life and death of stars, their remnants, such as black holes, and the larger structure of the universe, including dark matter and cosmology.

Fall 2010 – A proposal for a new UCC-21 (Core Curriculum) Tier 2 course, PHYCS 151, "Energy: Technology and Society," was written and approved by the Department and college committees. This course is intended to be of general interest and will develop the technology and science of energy use and generation, and will generate discussion on the effects these have on society and the environment.

Fall 2009 – Implemented the new course PHYCS 115, "Career Issues in Physics, Applied Physics, and Engineering," designed to assist new majors and minors in physics acclimate to the field. Included in the course were talks by all physics faculty members on their research activities, as well as speakers from the Ball State Counseling Center,

Development of course materials (continued)

Learning Center, Library, and other campus services that discussed student issues and resources.

Fall 2008 – Implemented changes to PHYCS 120, “General Physics I,” (calculus-based introductory physics), incorporating several changes to the labs that include World-in-Motion video software and changes to a portion of the measurements lab. Wrote a new hands-on laboratory exam that can assess students’ skills in the lab.

Fall 2006 – Incorporated several class demonstrations of the properties of electricity and magnetism courses, PHYCS 450/550 and 452/552. Students in advanced courses do not usually observe these phenomena firsthand in the classroom.

Fall 2006 – Revised the modern laboratory, PHYCS 262, to address faculty concerns about the experimental skills of our majors. Changes were made to include lectures, problems, and an evaluation of data analysis knowledge. Also, a student poster session on their experiments and an oral presentation by each student on an experiment in modern physics were incorporated.

Fall 2004 – Developed new course, PHYCS 200 (Now PHYCS 111), “Problem Solving in General Physics,” that has students work together in small groups to solve problems and conceptual questions, as well as provide a more relaxed, small-class atmosphere.

Fall 2003 – present - Use of the personal-response system (PRS) and other interactive strategies in the classroom, and computer-based homework problems (LON-CAPA) in the introductory physics courses.

Spring 1999 – Purdue University – North Central – Co-authored an introductory physics lab manual in mechanics and heat. “General Physics Laboratory Manual, Volume I,” P. C. Das and D. Grosnick, 1999.

Physics Teacher Education Coalition (PhysTEC)

Fall 2001 – Spring 2007 – Participated in PhysTEC program, sponsored by the American Physical Society and funded by the National Science Foundation, to produce more and better-trained physics teachers. Ball State was one of the initial six institutions in this program.

Fall 2007 – Spring 2008 – Principal investigator at Ball State University.

PhysTEC Noyce

Fall 2008 – Spring 2014 – Ball State’s representative to the PhysTEC Noyce Scholarship Program, which provides scholarship funds to eligible students who wish to become physics teachers. Facilitated meetings between preservice physics teachers and a high-school teacher and former PhysTEC Teacher-in-Residence, who mentored the Noyce scholars.

Professional Development

October 2017 - Attended Division of Nuclear Physics Annual Meeting in Pittsburgh, PA.

October 2016 - Attended Division of Nuclear Physics Annual Meeting in Vancouver, BC, Canada.

November 2013 – Attended “Symposium on Innovative Pedagogy,” Valparaiso University, Valparaiso, IN.

July 2013 – Attended STAR Analysis Meeting, Purdue University, West Lafayette, IN.

Professional Development (continued)

May 2013 – Attended workshop, “Opportunities for Polarized Physics at Fermilab,” Fermi National Accelerator Laboratory, Batavia, IL.

November 2009 – Participant in University Physics Focus Group sponsored by McGraw-Hill Publishing Company, Dubuque, IA.

March 2009 – Attended Annual PhysTEC Meeting in Pittsburgh, PA.

March 2008 – Attended Annual PhysTEC Meeting in Austin, TX.

March 2007 – Attended Annual PhysTEC Meeting in Boulder, CO.

March 2006 – Attended Annual PhysTEC Meeting in Fayetteville, AR.

August 2005 – Participant in workshop “Using RTOP to Improve Physics and Physical Science Teaching” at the annual summer AAPT meeting in Salt Lake City, UT.

March 2005 – Attended Annual PhysTEC Meeting in Muncie, IN.

March 2004 – Attended Annual PhysTEC Meeting in New Orleans, LA.

January 2004 – Participant in workshop “Introduction to Standardized Assessment Instruments for Novices” at the annual winter AAPT meeting in Albuquerque, NM.

January 2004 – Attended LON-CAPA Conference and Workshop 2004 held at the George Washington University.

February 2003 – Attended Annual PhysTEC Meeting in Tucson, AZ.

September 2001 – Attended Initial PhysTEC Meeting in College Park, MD.

Membership in Professional Societies

1. American Physical Society; Division of Particles and Fields and Division of Nuclear Physics
2. American Association of Physics Teachers

RESEARCH

Refereed publications

1. “First Observation of the Directed Flow of D^0 and \bar{D}^0 in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. Lett. **123**, 162301 (2019).
2. “Measurement of Inclusive J/ψ Suppression in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV Through the Dimuon Channel at STAR,” J. Adam *et al.*, (STAR Collaboration), Phys. Lett. B **797**, 134917 (2019).
3. “Observation of Excess J/ψ Yield at Very Low Transverse Momenta in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV and $U + U$ Collisions at $\sqrt{s_{NN}} = 193$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. Lett. **123**, 132302 (2019).
4. “Polarization of Λ ($\bar{\Lambda}$) Hyperons Along the Beam Direction in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. Lett. **123**, 132301 (2019).
5. “Charge-Dependent Pair Correlations Relative to a Third Particle in $p + Au$ and $d + Au$ Collisions at RHIC,” J. Adam *et al.*, (STAR Collaboration), Phys. Lett. B **798**, 134975 (2019).
6. “Measurements of the Transverse-Momentum-Dependent Cross Sections of J/ψ Production at Mid-Rapidity in $p + p$ Collisions at $\sqrt{s} = 510$ and 500 GeV with the STAR Detector,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. D **100**, 52009 (2019).
7. “Longitudinal Double-Spin Asymmetry for Inclusive Jet and Dijet Production in pp Collisions at $\sqrt{s} = 510$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. D **100**, 52005 (2019).
8. “Collision Energy Dependence of Second-Order Off-Diagonal and Diagonal Cumulants of Net-Charge, Net-Proton, and Net-Kaon Multiplicity Distributions in $Au + Au$ Collisions,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. C **100**, 14902 (2019).
9. “Beam Energy Dependence of (Anti-)Deuteron Production in $Au + Au$ Collisions at the BNL Relativistic Heavy Ion Collider,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. C **99**, 064905 (2019).
10. “Azimuthal Harmonics in Small and Large Collision Systems at RHIC Top Energies,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. Lett. **122**, 172301 (2019).
11. “Collision Energy Dependence of p_T Correlations in $Au + Au$ Collisions at the BNL Relativistic Heavy Ion Collider,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. C **99**, 044918 (2019).
12. “Centrality and Transverse Momentum Dependence of D^0 -Meson Production at Mid-Rapidity in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. C **99**, 034908 (2019).

Refereed publications (continued)

13. “Measurement of the Longitudinal Spin Asymmetries for Weak Boson Production in Proton-Proton Collisions at $\sqrt{s} = 510$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. D **99**, 051102(R) (2019).
14. “The Proton- Ω Correlation Function in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Lett. B **790**, 490 (2019).
15. “Constraining the Initial Conditions and Temperature Dependent Viscosity with Three-Particle Correlations in $Au + Au$ Collisions,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Lett. B **790**, 81 (2019).
16. “Improved Measurement of the Longitudinal Spin Transfer to Λ and $\bar{\Lambda}$ Hyperons in Polarized Proton-Proton Collisions at $\sqrt{s_{NN}} = 200$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. D **98**, 112009 (2018).
17. “Transverse Spin Transfer to Λ and $\bar{\Lambda}$ Hyperons in Polarized Proton-Proton Collisions at $\sqrt{s} = 200$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. D **98**, 091103(R) (2018).
18. “Erratum: Observation of D^0 Meson Nuclear Modifications in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV [Phys. Rev. Lett. **113**, 142301 (2014)],” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **121**, 229901 (2018).
19. “ J/ψ Production Cross Section and its Dependence on Charged-Particle Multiplicity in $p + p$ Collisions at $\sqrt{s} = 200$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Lett. B **786**, 87 (2018).
20. “Harmonic Decomposition of Three-Particle Azimuthal Correlations at Energies available at the BNL Relativistic Heavy Ion Collider,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **98**, 034918 (2018).
21. “Low $p_T e^+ e^-$ Pair Production in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV and $U + U$ Collisions at $\sqrt{s_{NN}} = 193$ GeV at STAR,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. Lett. **121**, 132301 (2018).
22. “Longitudinal Double-Spin Asymmetries for Dijet Production at Intermediate Pseudorapidity in Polarized pp Collisions at $\sqrt{s} = 200$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. D **98**, 32011 (2018).
23. “Longitudinal Double-Spin Asymmetries for π^0 s in the Forward Direction for 510 GeV Polarized pp Collisions,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. D **98**, 32013 (2018).
24. “Global Polarization of Λ Hyperons in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. C **98**, 14910 (2018).
25. “Collision Energy Dependence of Moments of Net-Kaon Multiplicity Distributions at RHIC,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Lett. B **785**, 551 (2018).

Refereed publications (continued)

26. “Beam Energy Dependence of Rapidity-Even Dipolar Flow in $Au + Au$ Collisions,” J. Adam *et al.*, (STAR Collaboration), Phys. Lett. B **784**, 26 (2018).
27. “Correlation Measurements Between Flow Harmonics in $Au + Au$ Collisions at RHIC,” J. Adam *et al.*, (STAR Collaboration), Phys. Lett. B **783**, 459 (2018).
28. “Azimuthal Anisotropy in Cu + Au Collisions at $\sqrt{s_{NN}} = 200$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **98**, 14915 (2018).
29. “Transverse Spin-Dependent Azimuthal Correlations of Charged Pion Pairs Measured in $p \uparrow + p$ Collisions at $\sqrt{s} = 500$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Lett. B **780**, 332 (2018).
30. “Measurement of ${}^3\Lambda H$ Lifetime in $Au + Au$ Collisions at the BNL Relativistic Heavy-Ion Collider,” J. Adam *et al.*, (STAR Collaboration), Phys. Rev. C **97**, 54909 (2018).
31. “Beam Energy Dependence of Jet-Quenching Effects in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 7.7, 11.5, 14.5, 19.6, 27, 39,$ and 62.4 GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **121**, 32301 (2018).
32. “Beam-Energy Dependence of Directed Flow of $\Lambda, \bar{\Lambda}, K^\pm, K_s^0$, and ϕ in $Au + Au$ Collisions,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **120**, 62301 (2018).
33. “Azimuthal Transverse Single-Spin Asymmetries of Inclusive Jets and Charged Pions Within Jets from Polarized-Proton Collisions at $\sqrt{s} = 500$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. D **97**, 32004 (2018).
34. “Coherent Diffractive Photoproduction of ρ^0 Mesons on Gold Nuclei at 200 GeV/nucleon-pair at the Relativistic Heavy Ion Collider,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **96**, 54904 (2017).
35. “Bulk Properties of the Medium Produced in Relativistic Heavy-Ion Collisions from the Beam Energy Scan Program,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **96**, 44904 (2017).
36. “Charge-Dependent Directed Flow in Cu + Au Collisions at $\sqrt{s_{NN}} = 200$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **118**, 12301 (2017).
37. “Measurements of Jet Quenching with Semi-Inclusive Hadron + Jet Distributions in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **96**, 24905 (2017).
38. “Di-Jet Imbalance Measurements in $Au + Au$ and $p + p$ Collisions at $\sqrt{s_{NN}} = 200$ GeV at STAR,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **119**, 62301 (2017).
39. “Global Λ Hyperon Polarization in Nuclear Collisions,” L. Adamczyk *et al.*, (STAR Collaboration), Nature **548**, 62 (2017).

Refereed publications (continued)

40. "Measurement of the Cross Section and Longitudinal Double-Spin Asymmetry for Dijet Production in Polarized Collisions pp Collisions at $\sqrt{s} = 200$ GeV," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. D **95**, 71103(R) (2017).
41. "Measurement of D^0 Azimuthal Anisotropy at Midrapidity in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **118**, 212301 (2017).
42. "Energy Dependence of J/ψ Production in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 39, 62.4$, and 200 GeV," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Lett. B **771**, 13 (2017).
43. "Direct Virtual Photon Production in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Lett. B **770**, 451 (2017).
44. "Charge-Dependent Directed Flow in $Cu + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **118**, 12301 (2016).
45. " Υ Production in $U + U$ collisions at $\sqrt{s_{NN}} = 193$ GeV with the STAR Experiment," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **94**, 64904 (2016).
46. "Measurement of Elliptic Flow of Light Nuclei at $\sqrt{s_{NN}} = 200, 62.4, 39, 27, 19.6, 11.5$, and 7.7 GeV at RHIC," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **94**, 34908 (2016).
47. "Beam-Energy Dependence of Charged Balance Functions from $Au + Au$ Collisions at RHIC," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **94**, 24909 (2016).
48. "Near-Side Azimuthal and Pseudorapidity Correlations Using Neutral Strange Baryons and Mesons in $d + Au$, $Cu + Cu$, and $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **94**, 14910 (2016).
49. "Jet-like Correlations with Direct-Photon and Neutral Pion Triggers at $\sqrt{s_{NN}} = 200$ GeV," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Lett. B **760**, 689 (2016).
50. " J/ψ Production at Low Transverse Momentum in $p + p$ and $d + Au$ Collisions at $\sqrt{s} = 200$ GeV," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **93**, 64904 (2016).
51. "Measurement of the Transverse Single-Spin Asymmetry in $p + p \rightarrow W/Z^0$ at RHIC," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **116**, 132301 (2016).
52. "Beam Energy Dependence of the Third Harmonic of Azimuthal Correlations in $Au + Au$ Collisions at RHIC," L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **116**, 112302 (2016).

Refereed publications (continued)

53. “Centrality and Transverse Momentum Dependence of Elliptic Flow of Multi-strange Hadrons and Phi Meson in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **116**, 62301 (2016).
54. “Probing Parton Dynamics of QCD Matter with Omega and Phi Production,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **93**, 21903 (2016).
55. “Centrality Dependence of Identified Particle Elliptic Flow in Relativistic Heavy Ion Collisions at $\sqrt{s_{NN}} = 7.7 - 62.4$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **93**, 14907 (2016).
56. “Observation of Transverse Spin-Dependent Azimuthal Correlations of Charged Pion Pairs in $p + p$ at $\sqrt{s} = 200$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **115**, 242501 (2015).
57. “Azimuthal Anisotropy in $U + U$ and $Au + Au$ Collisions at RHIC,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **115**, 222301 (2015).
58. “Energy Dependence of Acceptance-Corrected Dielectron Excess Mass Spectrum at Mid-Rapidity in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 19.6$ and 200 GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Lett. B **750**, 64 (2015).
59. “Di-Hadron Correlations with Identified Leading Hadrons in 200 GeV $Au + Au$ and $d + Au$ Collisions at STAR,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Lett. B **751**, 233 (2015).
60. “Measurement of Interaction Between Antiprotons,” L. Adamczyk *et al.*, (STAR Collaboration), Nature **527**, 345 (2015).
61. “Precision Measurement of the Longitudinal Double-Spin Asymmetry for Inclusive Jet Production in Polarized Proton Collisions at $\sqrt{s} = 200$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. Lett. **115**, 92002 (2015).
62. “Measurements of Dielectron Production in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV from the STAR Experiment,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **92**, 24912 (2015).
63. “Energy Dependence of K - π , p - π , and K - p Fluctuations in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 7.7 - 200$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Rev. C **92**, 21901 (2015).
64. “Long-Range Pseudorapidity Dihadron Correlations in $d + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV,” L. Adamczyk *et al.*, (STAR Collaboration), Phys. Lett. B **747**, 265 (2015).
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188. “Multiplicity and Pseudorapidity Distributions of Charged Particles and Photons at Forward Pseudorapidity in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 62.4$ GeV,” J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **73**, 034906 (2006).
189. “Directed Flow in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 62.4$ GeV,” J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **73**, 034903 (2006).

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190. "Distributions of Charged Hadrons Associated with High Transverse Momentum Particles in pp and $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. Lett. **95**, 152301 (2005).
191. "Incident Energy Dependence of p_T Correlations at Relativistic Energies," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **72**, 044902 (2005).
192. "Multistrange Baryon Elliptic Flow in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. Lett. **95**, 122301 (2005).
193. "Search for the Forbidden Decays $\eta \rightarrow 3\gamma$ and $\eta \rightarrow \pi^0\gamma$ and the Rare Decay $\eta \rightarrow \pi^0\pi^0\gamma\gamma$," B. M. K. Nefkens *et al.*, (Crystal Ball Collaboration), Phys. Rev. C **72**, 035212 (2005).
194. "Multiplicity and Pseudorapidity Distributions of Photons in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 62.4$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. Lett. **95**, 062301 (2005).
195. "Measurement of the Branching Ratio for $\eta \rightarrow \pi^0\gamma\gamma$ Decay," S. Prakhov *et al.*, (Crystal Ball Collaboration), Phys. Rev. C **72**, 025201 (2005).
196. "Measurement of $\pi^+p \rightarrow \pi^0n$ in the Vicinity of the η Threshold," A. Starostin *et al.*, (Crystal Ball Collaboration), Phys. Rev. C **72**, 015205 (2005).
197. "Azimuthal Anisotropy in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **72**, 014904 (2005).
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199. "Event-wise $\langle p_T \rangle$ Fluctuations in $Au-Au$ Collisions at $\sqrt{s_{NN}} = 130$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **71**, 064906 (2005).
200. " $K(892)^*$ Resonance Production in $Au + Au$ and $p + p$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **71**, 064902 (2005).
201. "Pion Interferometry in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **71**, 044906 (2005).
202. "Transverse-Momentum Dependent Modification of Dynamic Texture in Central $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **71**, 031901 (2005).
203. "Open Charm Yields in $d + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. Lett. **94**, 062301 (2005).
204. "Test of Charge Conjugation Invariance," B. M. K. Nefkens *et al.*, (Crystal Ball Collaboration), Phys. Rev. Lett. **94**, 041601 (2005).

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205. "Azimuthal Anisotropy and Correlations at Large Transverse Momenta in $p + p$ and $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. Lett. **93**, 252301 (2004).
206. "Pseudorapidity Asymmetry and Centrality Dependence of Charged Hadron Spectra in $d + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **70**, 064907 (2004).
207. "Measurements of Transverse Energy Distributions in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **70**, 054907 (2004).
208. "Azimuthally Sensitive Hanbury Brown-Twiss Interferometry in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. Lett. **93**, 012301 (2004).
209. "Multistrange Baryon Production in $Au-Au$ Collisions at $\sqrt{s_{NN}} = 130$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. Lett. **92**, 182301 (2004).
210. "Photon and Neutral Pion Production in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 130$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. C **70**, 044902 (2004).
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214. "Reaction $K^- p \rightarrow \pi^0 \pi^0 \Sigma^0$ at $p_K^- = 514 - 750$ MeV/ c and Comparison with Other $\pi^0 \pi^0$ Production," S. Prakhov *et al.*, (Crystal Ball Collaboration), Phys. Rev. C **70**, 034605 (2004).
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216. "Relative Branching Ratio of the $\eta \rightarrow \pi^0 \gamma \gamma$ Decay Channel," N. Knecht *et al.*, (Crystal Ball Collaboration), Phys. Lett. B **589**, 14 (2004).
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222. "Does the $\Sigma(1580)\frac{3}{2}^-$ Resonance Exist?" J. Olmsted *et al.*, (Crystal Ball Collaboration), Phys. Lett. B **588**, 29 (2004).
223. "Identified Particle Distributions in pp and $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, (STAR Collaboration), Phys. Rev. Lett. **92**, 112301 (2004).
224. " ρ^0 Production and Possible Modification in $Au + Au$ and $p + p$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, Phys. Rev. Lett. **92**, 092301 (2004).
225. "Azimuthal Anisotropy at the Relativistic Heavy Ion Collider: The First and Fourth Harmonics," J. Adams *et al.*, Phys. Rev. Lett. **92**, 062301 (2004).
226. "Particle-Type Dependence of Azimuthal Anisotropy and Nuclear Modification of Particle Production in $Au + Au$ Collisions at $\sqrt{s_{NN}} = 200$ GeV," J. Adams *et al.*, Phys. Rev. Lett. **92**, 052302 (2004).
227. "Pion-Kaon Correlations in Central $Au + Au$ Collisions at $\sqrt{s_{NN}} = 130$ GeV," J. Adams *et al.*, Phys. Rev. Lett. **91**, 262302 (2003).
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229. "Search for $K^- p \rightarrow \pi^0 \pi^0 \pi^0 \Lambda$ from Threshold to $p_{K^-} = 750$ MeV/c," M. Borgh, *et al.*, Phys. Rev. C **68**, 015206 (2003).
230. "Measurement of the $\pi^- p \rightarrow 3\pi^0 n$ Total Cross Section from Threshold to 0.75 GeV/c," A. Starostin *et al.*, Phys. Rev. C **67**, 068201 (2003).
231. "Dynamics of the $\pi^- p \rightarrow \pi^0 \pi^0 n$ Reaction for $p_{\pi^-} < 750$ MeV/c," K. Craig *et al.*, Phys. Rev. Lett. **91**, 102301 (2003).
232. "Transverse-Momentum and Collision-Energy Dependence of High- p_T Hadron Suppression in $Au + Au$ Collisions at Ultrarelativistic Energies," J. Adams *et al.*, Phys. Rev. Lett. **91**, 172302 (2003).

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234. "Properties of the $\Lambda(1607)1/2^-$ Resonance," D. M. Manley *et al.*, Phys. Rev. Lett. **88**, 012002 (2002).
235. "Determination of the Quadratic Slope Parameter in $\eta \rightarrow 3\pi^0$ Decay," W. B. Tippens *et al.*, Phys. Rev. Lett. **87**, 192001 (2001).
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237. "Measurement of the Neutron Detection Efficiencies in NaI Using the Crystal Ball Detector," T. D. S. Stanislaus *et al.*, Nucl. Instrum. Meth. Phys. Res. A **462**, 463 (2001).
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239. "Angular Dependence of the pp Elastic-Scattering Spin Correlation Parameter A_{oonn} Between 0.8 and 2.8 GeV. II. Results for Higher Energies," C. E. Allgower *et al.*, Phys. Rev. C **64**, 034003 (2001).
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241. "Measurement of the $\pi^0\pi^0$ Production in Nuclear Medium by π^- at 0.408 GeV/c," A. B. Starostin *et al.*, Phys. Rev. Lett. **85**, 5539 (2000).
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243. "Angular Dependence of the pp Elastic-Scattering Analyzing Power Between 0.8 and 2.8 GeV. II. Results for Higher Energies," C. E. Allgower *et al.*, Phys. Rev. C **60**, 054002 (1999).
244. "Angular Dependence of the pp Elastic-Scattering Analyzing Power Between 0.8 and 2.8 GeV. I. Results for 1.80-2.24 GeV," C. E. Allgower *et al.*, Phys. Rev. C **60**, 054001 (1999).
245. "Quasi-elastic pn Scattering in ^6LiD and ^6LiH Targets From 1.1 to 2.4 GeV," A. de Lesquen *et al.*, Eur. Phys. J. C **11**, 69 (1999).
246. "Elastic and Quasi-elastic pp Scattering in ^6LiH and ^6LiD Targets Between 1.1 and 2.4 GeV," J. Ball *et al.*, Eur. Phys. J. C **11**, 51 (1999).
247. "Measurement of the pp Analyzing Power in the Vicinity of 2.20 GeV," J. Ball *et al.*, Eur. Phys. J. C **10**, 409 (1999).
248. "Polarimetry of the Polarized Proton and Deuteron Beams at Intermediate Energies," A. N. Prokofiev *et al.*, Czech. J. Phys. **49/S2**, 29 (1999).

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251. "Angular Dependence of pp Spin Correlation and Rescattering Observables Between 1.98 and 2.80 GeV/c," C. E. Allgower *et al.*, Eur. Phys. J. C **1**, 131 (1998).
252. "Measurement of Single-Spin Asymmetry in η -Meson Production in pp and $\bar{p}p$ Interactions in the Beam Fragmentation Region at 200 GeV/c," D. L. Adams *et al.*, (The E-581/E-704 Collaboration), Nucl. Phys. B **510**, 3 (1998).
253. "Measurement of the Differences in the Total Cross Section for Antiparallel and Parallel Longitudinal Spins and a Measurement of Parity Nonconservation with Incident Polarized Protons and Antiprotons at 200 GeV/c," D. P. Grosnick *et al.*, (The E-581/E-704 Collaboration), Phys. Rev. D **55**, 1 (1997).
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258. "Measurement of Single Spin Asymmetry for Direct Photon Production in pp Collisions at 200 GeV/c," D. L. Adams *et al.*, (The E-581/E-704 Collaboration), Phys. Lett. B **345**, 569 (1995).
259. "The Movable Polarized Target as a Basic Equipment for High Energy Spin Physics Experiments at the JINR-Dubna Accelerator Complex," F. Lehar *et al.*, Nucl. Instrum. Methods **A356**, 58 (1995).
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261. "Measurement of the Double-Spin Asymmetry A_{LL} for Inclusive Multi- γ Pair Production with 200 GeV/c Polarized Proton Beam and Polarized Proton Target," D. L. Adams *et al.*, (The E-581/E-704 Collaboration), Phys. Lett. B **336**, 269 (1994).
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263. "Measurement of the Longitudinal Spin-Dependent Neutron-Proton Total Cross-Section Difference $\Delta\sigma_L(np)$ Between 500 and 800 MeV," M. Beddo *et al.*, Phys. Rev. D **50**, 104 (1994).
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269. "Analyzing Power in Inclusive π^+ and π^- Production at High x_F with a 200 GeV Polarized Proton Beam," D. L. Adams *et al.*, (The E-581/E-704 Collaboration), Phys. Lett. B **264**, 462 (1991).
270. "Comparison of Spin Asymmetries and Cross Sections in π^0 Production by 200-GeV Polarized Antiprotons and Protons," D. L. Adams *et al.*, Phys. Lett. B **261**, 201 (1991).
271. "First Results for the Two-Spin Parameter A_{LL} in π^0 Production by 200-GeV Polarized Protons and Antiprotons," D. L. Adams *et al.*, Phys. Lett. B **261**, 197 (1991).
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274. "Measurement of the Analyzing Power in the Primakoff Process with a High-Energy Polarized Proton Beam," D. C. Carey *et al.*, Phys. Rev. Lett. **64**, 357 (1990).
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278. "New Searches for the C-Noninvariant Decay $\pi^0 \rightarrow 3\gamma$ and the Rare Decay $\pi^0 \rightarrow 4\gamma$," R. D. Bolton *et al.*, Phys. Rev. D **38**, 2121 (1988).

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280. "Design and Performance of Modularized NaI(Tl) Detectors with Rectangular Crystal Elements: An Array of 49 and the Crystal Box," S. L. Wilson *et al.*, Nucl. Instrum. Methods **A264**, 263 (1988).
281. "Light-Boson Emission in the Decay of the μ^+ ," T. Goldman *et al.*, Phys. Rev. D **36**, 1543 (1987).
282. "Search for the Rare Decay $\mu^+ \rightarrow e^+ \gamma \gamma$," D. P. Grosnick *et al.*, Phys. Rev. Lett. **57**, 3241 (1986).
283. "Unique Determination of the Form Factor Ratio in Radiative Pion Decay," L. E. Piilonen *et al.*, Phys. Rev. Lett. **57**, 1402 (1986).
284. "Search for the Decay $\mu^+ \rightarrow e^+ \gamma$," R. D. Bolton *et al.*, Phys. Rev. Lett. **56**, 2461 (1986).
285. "Search for the Muon-Number-Nonconserving Decay $\mu^+ \rightarrow e^+ e^- e^+$," R. D. Bolton *et al.*, Phys. Rev. Lett. **53**, 1415 (1984).
286. "Design and Performance of a Stereo Drift Chamber with Closely Packed Planes," R. D. Bolton *et al.*, Nucl. Instrum. Methods **188**, 275 (1981).

Technical Publication

1. "Analysis of STAR ZDC SMD Data for Polarimetry," M.B. Bitters, D.P. Grosnick, *et al.*, STAR Note SN0480, (2009).

Grants Received

1. Spring 2017, "Studies of Nucleon Spin Structure from Polarized Proton Collisions at RHIC," T.D.S. Stanislaus (P.I.), A. Gibson, D. Grosnick, D. Koetke, and P. Nord, Valparaiso University, submitted to the Department of Energy Office of Science: Medium Energy Nuclear Physics, April 2014, \$750,000 (3-year total to Valparaiso University). Partially funded. Research on experimental program to study spin structure of proton using STAR detector at Brookhaven National Laboratory.
2. Spring 2014, "Studies of Nucleon Spin Structure from Polarized Proton Collisions at RHIC," T.D.S. Stanislaus (P.I.), A. Gibson, D. Grosnick, D. Koetke, and P. Nord, Valparaiso University, submitted to the Department of Energy Office of Science: Medium Energy Nuclear Physics, April 2014, \$742,000 (3-year total to Valparaiso University). Partially funded. Research on experimental program to study spin structure of proton using STAR detector at Brookhaven National Laboratory.
3. Fall 2011, "Experimental Tests of the Standard Model for Particles and Nuclei," T.D.S. Stanislaus (P.I.), A. Gibson, D. Grosnick, D. Koetke, and P. Nord, Valparaiso University, to the Department of Energy Office of Science: Medium Energy Nuclear Physics, 02 August 2011, DOE Grant Number: DE-FG02-88ER40416, \$560,000 (3-year total to

Grants Received (continued)

- Valparaiso University). Research on experimental program to study spin structure of proton using STAR detector at RHIC and nEDM experiment at Los Alamos. A Ball State University graduate student received a summer stipend from this grant.
4. Fall 2008, "PhysTEC Noyce Scholars," National Science Foundation, American Physical Society, Principal Investigator: Monica Plisch, (several college institutional participants) \$749,773 (5-year total to PhysTEC). Scholarships to students to become physics teachers. Four scholarships have been given to Ball State University students and the salary for a high-school master teacher as mentor.
 5. Fall 2008, "Measuring the Spin Structure of the Proton at RHIC," Department of Energy, Valparaiso University, Co-principal Investigators: R. Manweiler and T.D.S. Stanislaus \$350,000 (3-year total to Valparaiso University). Research on experimental program to study spin structure of proton using STAR detector at RHIC. Ball State University graduate and undergraduate students received summer stipends from this grant.
 6. Fall 2007, "PhysTEC: Physics Teacher Education Coalition," National Science Foundation, \$19,964. Grant to increase the number and improve the education of physics teachers.
 7. Fall 2003, "ANL Graduate Assistantship 2003-2004," Argonne National Laboratory, \$10,092. Sponsor Ball State graduate student.
 8. Spring 2004, "Identifying and Improving the Performance of At-Risk Science Students in PHYCS 110 and 112," Lilly II Grant, \$15,500.
 9. Spring 2004, Argonne National Laboratory Graduate Assistantship extension, grant to support a graduate student for particle physics research at Argonne National Laboratory. \$2,885
 10. Fall 2003, Argonne National Laboratory Graduate Assistantship, grant to support a graduate student for particle physics research at Argonne National Laboratory. \$10,092
 11. Spring 2003, "Identifying and Improving the Performance of At-Risk Science Students in PHYCS 110 and 112," Lilly II Grant, Ball State University. (several departmental authors) \$14,700
- 2002 – present Internal funding for instructional equipment for physics laboratories. Total approximately \$50,000

Grants Submitted

1. Spring 2020, "Studies of Nucleon Spin Structure from Polarized Proton Collisions at RHIC," T.D.S. Stanislaus (P.I.), A. Gibson, D. Grosnick, D. Koetke, and P. Nord, Valparaiso University, submitted to the Department of Energy Office of Science: Medium Energy Nuclear Physics, February 2017, estimated \$750,000 (3-year total to Valparaiso University). Status: under review. Research on experimental program to study spin structure of proton using STAR detector at Brookhaven National Laboratory.

Sponsorship of student grants

1. Fall 2005 – “Fiziks is Phun,” Courtney Rowe-Bultinck, President BSU Chapter of the Society of Physics Students, and Melissa Bitters, BSU SPS Secretary, 2006 Marsh White Award from the American Physical Society for physics outreach to schools. \$298
2. Fall 2003 – “Fiziks is Phun,” Melissa Hendrichsen, President BSU Chapter of the Society of Physics Students, 2004 Marsh White Award from the American Physical Society for physics outreach to schools. \$300

Presentations at professional meetings

1. “Local Polarimetry for Proton Beams with STAR ZDC Calorimeters,” D.P. Grosnick for the STAR Collaboration, 2008 Fall Meeting of the Division of Nuclear Physics, American Physical Society, Oakland, CA, October 2008.
2. “Stimulating Student Learning in Multiple Dimensions Through Introductory Laboratories,” panel presentation with Laura Blasi, The University of Central Florida; Christopher Hight, Rice University; and Gary Morris and Robert Swanson, Valparaiso University, 2007 Annual Meeting, Association of American Colleges and Universities, New Orleans, LA, January 2007.
3. “The Team Model of PhysTEC at Ball State University,” invited talk presented at the April Meeting 2006 of the American Physical Society, Dallas, Texas, April 2006.
4. “PhysTEC: A Program to Improve the Science Preparation of Future K-12 Teachers,” 2005 Fall Meeting, College Science Educators of Indiana, Indiana University-Purdue University at Ft. Wayne, Ft. Wayne, IN, September 2005.
5. “Implementing the PET Curriculum at Ball State University,” poster presented at the 2005 Winter Meeting of the American Association of Physics Teachers, Albuquerque, NM, January 2005.
6. “Measurement of the Radiative Reaction $K^- p \rightarrow \Sigma^0 \gamma$,” presented at the 2000 Fall Meeting of the Division of Nuclear Physics, Williamsburg, Virginia, October 2000.
7. “A Measurement of the Branching Ratio $K^- p \rightarrow \gamma \Sigma^0$,” presented at the 1999 Fall Meeting of the Division of Nuclear Physics, Asilomar, California, October 1999.

Professional/creative endeavor presentations

1. “The Puzzle of Nucleon Spin,” Department of Physics and Astronomy Colloquium, Ball State University, Muncie, IN, 24 January 2013.

Presentations at professional meetings (continued)

2. "What is PhysTEC? The Preparation of Future Physics Teachers," Department of Physics and Astronomy Colloquium, Valparaiso University, Valparaiso, IN, October 2008.
3. "Master Teachers = Teachers-in-Residence = Success!," poster presented at 2008 PhysTEC Meeting, University of Texas, Austin, TX, February 2008.
4. "Recruitment of Physics Majors and Physics Teaching Majors: A Multi-layered Approach at Ball State University," poster presented at 2007 PhysTEC Meeting, University of Colorado, Boulder, CO, March 2007.
5. "A Very Brief Introduction to RTOP," with N. Anthony, Department of Physics and Astronomy Colloquium, Ball State University, Muncie, February 23, 2006.
6. "Who are they? And How Are the Future 'Highly Qualified' Physics and Physical Science Teachers Being Prepared for Our Schools?" with M. Wolter, R. Hill, and N. Anthony, Department of Physics and Astronomy Colloquium, Ball State University, Muncie, September 8, 2005.
7. "Personalized Web-Based Homework Using LON-CAPA," co-presented with Thomas Robertson at the Teaching and Learning Conference 7, Ball State University, Muncie, March 18, 2005.
8. "The Use of Computer-Based Instructional Materials at Ball State University," poster presented at 2005 PhysTEC Annual Meeting, Ball State University, March 2005.
9. "Improving Student Performance in First Year Physics Classes," poster presented at 2005 PhysTEC Annual Meeting, Ball State University, March 2005.
10. "Laboratories in Studio Format at Ball State University," presented at the Fifth Annual PhysTEC Conference/Workshop, Xavier University, New Orleans, March 2004.
11. "PhysTEC at Ball State University," Physics and Astronomy Colloquium, Ball State University, January 2004.
12. "The Puzzle of Nucleon Spin," Department of Physics and Astronomy Colloquium, Ball State University, June 17, 2003.
13. "PhysTEC: A Program to Improve the Science Preparation of Future K-12 Teachers," presented at the Fall CSUI-ANL Conference on Education in Engineering, Mathematics, and the Sciences, Argonne National Laboratory, Nov. 1, 2002.

Non-refereed publications

1. "An Advisory Group to Provide Input in the Preparation of Future Teachers," D. Grosnick, Spring 2005 Newsletter, APS Forum on Education, American Physical Society, Spring 2005.

PROFESSIONAL SERVICE

Service – Profession

1. May 2009 – Member of a national review panel for funding proposals submitted to the National Science Foundation for the Robert Noyce Teacher Scholarship Program. This program supports the training of STEM teachers and each grant is funded for a maximum of \$750,000 over 5 years.
2. May 2006 – Lead Special Awards Judge for the American Physical Society and American Association of Physics Teachers at the 2006 Intel International Science and Engineering Fair, Indianapolis, Indiana.

Service – Ball State University

1. Member: University Senate, 2008 – 2014
2. Member: Faculty Council, 2008 – 2014
3. Member: Faculty Mentorship Program for students with disabilities, 2015 – present
4. University Committees:
 - Member, Faculty Council Representative, Finance and Budgetary Affairs Committee, 2011 – 2014
 - Member, Faculty Council Representative, Student Financial Assistance Committee, 2011 – 2013
 - Member, Goldwater Scholarship Selection Committee; 2009; 2011 – present
 - Member, Radiation Safety Committee, 2003 – present
 - Member, University Accreditation Committee, 2011 – 2012
 - Member, Subcommittee to Develop Homeland Security Major, 2004 – 2005
5. College Committees:
 - Member, Dean Search Committee, 2016 - 2017
 - Member, Promotion and Tenure Committee, 2019-2020; 2016 – 2017; 2014 – 2015; 2011 – 2012; 2006 – 2007
 - Member, Faculty Advisory Council, 2018-2019; 2007 – 2010
 - Member, Panel Discussion on Promotion and Tenure, 2015; 2012
6. Department Committees:
 - Member, Promotion and Tenure Committee, 2019-2020 (Chair); 2016 – 2017; 2014 – 2015 (Chair); 2011 – 2012 (Chair); 2010 – 2011; 2007 – 2008; 2006 – 2007 (Chair); 2005 – 2006

Service – Ball State University (continued)

- Member, Facilities and Professional Development, 2017-2020; 2008 – 2016; 1999 – 2006
- Member, Curriculum and Assessment, 2019 – 2020; 2018 – 2019 (Chair); 2011 – 2018; 2010 – 2011 (Chair); 2009 – 2010; 2007 – 2009 (Chair); 2005 – 2007; 1999 – 2000
- Member, Undergraduate Committee, 2015-2019; 2011 – 2014; 2007 – 2010; 2005 – 2007 (Chair); 2000 – 2005
- Member, Faculty Search Committee, 2011 – 2013; 2006 – 2007; 2003 – 2004 (Chair)
- Member, Department Chair Election Committee, 2019, 2015 – 2016
- 7. Participant in Graduate Student Development Conference, “Hints for Effective Laboratory Instruction,” 2005 – 2009

Service – Department of Physics and Astronomy

1. Advisor for the Society of Physics Students and the $\Sigma\pi\epsilon$ physics honorary society, 2000 – present
 - 2018 – Honorable Mention for SPS Distinguished Chapter award, National Office of the Society of Physics Students
 - 2007 – Finalist for Outstanding SPS Chapter Advisor award, National Office of the Society of Physics Students
 - 2006 – Winner of Blake Lilly award for outstanding outreach to middle and high school students, National Office of the Society of Physics Students
 - 2006 – Winner of Outstanding SPS Chapter award, National Office of the Society of Physics Students
 - 2006 – Winner of Marsh White award, National Office of the Society of Physics Students
 - 2004 – Winner of Marsh White award, National Office of the Society of Physics Students
2. Student academic advisor, 2007 – present
3. Faculty mentor, 2007 – 2008 (Joel Bryan); 2004 – 2005 (Jeff Sayers); 2003 – 2004 (Eric Hedin)
4. Department of Physics and Astronomy representative to “Friends of Physics” for the American Physical Society, 2005 – present
5. Introductory physics lab coordinator, 2002 – present
6. Peer class evaluations of faculty, 2010 – 2012
7. Participation in College Awareness Days, 2016, 2008, 2004

Service – Department of Physics and Astronomy (continued)

8. Participation in physics demonstrations at Indiana State Fair, 2005 – 2007
9. Participation in student field trips: ANL March 2012; FNAL March 2011; ANL Oct. 2006
10. Member of PhysTEC Teaching Advisory Group, 2001 – 2004

Service – Area High Schools

1. October 2004 – Assisted in installation of *World-in-Motion* software at Muncie Central High School. Will be used in future physics experiments.
2. April 2004 – Talked with Advanced Placement Physics class at Muncie Central High School on experimental nuclear physics.

Other

1. 7 February 2017 – Named Faculty Honorary Captain of Ball State men's volleyball team, selected by student athletes

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