

## Nikos Varelas

Associate Dean for Student Academic Affairs, College of Liberal Arts and Sciences  
Liberal Arts and Sciences Distinguished Professor of Physics  
University of Illinois at Chicago

### Education

1994 Ph.D. in Physics, University of Rochester, Rochester, New York  
1985 B.S. in Physics, University of Athens, Athens, Greece

### Professional Appointments

2014 - present	Associate Dean	College of Liberal Arts and Sciences, UIC
2014 - present	Distinguished Professor	College of Liberal Arts and Sciences, UIC
2012 - present	Fellow	Honors College, UIC
2007 - present	Professor	Department of Physics, UIC
2006 - 2007	Guest Scientist	Fermilab
2005	Guest Scientist	Fermilab
2003 - 2007	Associate Professor	Department of Physics, UIC
2001	Guest Scientist	Fermilab
1997 - 2003	Assistant Professor	Department of Physics, UIC
1994 - 1997	Research Associate	Department of Physics, Michigan State University
1986 - 1994	Graduate Research Assistant	Department of Physics, University of Rochester

### Honors and Awards

2014 Distinguished Professor, College of Liberal Arts and Sciences, UIC  
2013 Fellow, American Association for the Advancement of Science (AAAS)  
*Citation: For distinguished contributions to the field of experimental particle physics, particularly to the study of quantum chromodynamics at high energies.*  
2013 University Scholar, University of Illinois  
2012 Outstanding Faculty Award, College of Liberal Arts and Sciences, UIC  
2012 Faculty Service Award, College of Liberal Arts and Sciences, UIC  
2012 Senior Fellow, LHC Physics Center, Fermilab  
2010 Most Valuable Reviewer for *Physics Letters B*  
2006 Teaching Recognition Program Award, UIC  
1990 - 1991 Agnes M. and George Messersmith Graduate Fellowship  
University of Rochester  
1981 - 1985 National Scholarship for Outstanding Performance  
University of Athens, Greece (awarded separately for each of the four academic years)

### Selected Administrative Achievements

*Associate Dean for Student Academic Affairs, College of Liberal Arts and Sciences (2014-present)*

Responsible for setting, reviewing, and implementing educational policies on behalf of the college. Oversight of all curricular reforms and initiatives, including serving as ex-officio on the College of Liberal Arts and Sciences (LAS) Educational Policy Committee, which reviews, discusses, and acts on various proposals that affect the curriculum and educational policy of the college. To this end, fostered the creation of one Bachelor's and one Master's program, four Minor programs and one concentration, and the revision of 18 degree programs and one certificate. Implementation of

student success initiatives, oversight of student research initiatives, and college representative on university committees. As part of the Dean's management team, involved in the overall planning of college priorities and goals. Advise the Dean on matters related to undergraduate student policies and programs.

- Led the development from inception through approval of the B.S. in Liberal Arts and Sciences, Major in Integrated Health Studies. The degree draws upon the research and educational expertise in the health sciences of the College of Liberal Arts and Sciences and the College of Applied Health Sciences, with a primary goal to offer a diverse, interdisciplinary curriculum that includes relevant core content spanning the life sciences, physical sciences, social sciences, and the humanities. The program will be jointly supported by the LAS Departments of Biological Sciences and Psychology and administered by the Department of Biological Sciences.
- Chaired a committee to reform the introductory calculus courses (2014) that consisted of faculty from LAS, College of Engineering, College of Business, and College of Architecture, Design and the Arts, aiming at improving the curriculum and instructional methods of the introductory calculus series. Several reforms were implemented as a result of this committee's work that have led to significant improvements in student performance and success in the calculus courses. Some of these reforms include: improvements in curriculum and course syllabi, offering additional workshops to students, adjusting placement and AP credit requirements, hiring a calculus coordinator and a remedial math coordinator, introducing a new calculus course for life sciences, and decreasing the number of credit hours in the two calculus courses.
- Supported an initiative from the Department of English for first-year students who have placed into a remedial English course, which allowed students to register for an enriched first-year writing workshop course, linked to an additional hour of instruction and credit, in parallel to the first-year academic writing course. A pilot program was run in Fall 2015 and was very successful and the program will be expanded in Fall 2016. This initiative was recommended by the Student Success Initiative project.
- Supported the creation of a new standalone accelerated degree program by the Department of Economics, the Master of Arts in Applied Economics, designed to offer students rigorous training in economics and micro-econometrics with an emphasis on empirical analysis in the fields of labor, and health and education economics, which will enable graduates to develop, implement, or support better practices and policies in the public and private sectors alike.
- Supported the Physics Department in revising the physics curriculum to include either passing a placement test or successfully completing a preparatory course before matriculating into the calculus-based introductory course (PHYS 141). The preparatory course will strengthen the students' quantitative and physical reasoning skills required for PHYS 141.
- Oversaw reforms and assessment of the Writing, Math, and Science Learning Centers. Established an assessment plan to evaluate and improve the performance of the centers. Developed a plan for a joint Math and Science Learning Center which will provide a student-centered space for increased tutoring support. New course was implemented to prepare undergraduate students to become effective peer leaders in the Science Learning Center. Expanded the peer-led tutoring program to the Math Learning Center.
- Worked with LAS departments to improve student success in courses with traditionally high DFUW grades. Since Spring 2014, the number of LAS courses with high DFUW rates has

significantly decreased. An example of one such initiative is the introduction of tutoring for the philosophy course PHIL 102 *Introduction to Logic* offering to students a large number of supervised, by a graduate teaching assistant, study sessions to work with other students on homework, preparation for exams, and other course related projects. The DFW rates for the course dropped significantly for the two semesters that this program was implemented.

- Oversight of the LAS Undergraduate Research Initiative (LASURI) that was created to encourage and support student research for a full academic year with a faculty mentor across all disciplines.
- Supported the Department of Earth and Environmental Sciences to develop an NSF proposal on establishing partnerships to recruit geoscience undergraduates from urban schools in Chicago. The proposal was recently funded for three years.
- College representative to the Council on Teacher Education (CTE) which oversees the programs that prepare teachers, school leaders, and school service personnel for licensure by the state of Illinois.
- Led the revision of the credit-granting policy of LAS courses to accept Advanced Placement (AP) exam scores of 3, 4, and 5 in accordance to a recently amended Illinois Law (2015).
- Traveled to several cities in China as part of the State of Illinois Higher Education Trade Mission to recruit undergraduate students (2014). Visited 8 high schools with approximately 800 students, participated in round-table discussions with 18 colleges and universities, and participated in a College Fair organized by the U.S. Consulate in Shanghai. Collaborated with UIC's US-Asia Executive Development Program office to develop a program that will recruit undergraduates from China to LAS.
- Participated in Big Ten member university (CIC) conferences.
- College contact for the re-accreditation effort organized by the Vice Provost for Programs and Planning.

### **College of Liberal Arts and Sciences and University Committees**

2016 - present	Academic Program Approval Process Committee (University wide)
2015 - present	UIC's lead representative on the University of Illinois PARCC Committee
2015 - present	Member of the UIC Faculty Senate General Education Council
2015	Elected Member of the UIC Faculty Senate Educational Policy Committee
2015 - present	Elected Member of the UIC Faculty Senate
2014 - present	Member of the UIC Committee of Assistant and Associate Deans (CAAD)
2014 - present	Ex-officio Member of the LAS Educational Policy Committee
2014	Chair of the Calculus Curriculum Reform Committee
2013 - 2014	Co-Chair of the Faculty Engagement Task Force of the UIC Student Success Plan
2013 - 2014	Member of the Task Force Steering Committee of the UIC Student Success Plan
2013	Panelist at the New Faculty Orientation organized by the Vice Provost for Faculty Affairs
2013 - 2014	Elected Member of the LAS Executive Committee
2012	Reviewer for the Chancellor's Graduate Research Fellowship Program
2012 - present	Honors College Fellow
2012 - 2015	Elected Member of the UIC Faculty Senate
2010 - 2012	Elected Member of the LAS Executive Committee

2010 Chair of a Review Committee for a 5-year performance evaluation of LAS Department Head  
 2001 - 2003 Elected Member of the LAS Elections Committee

### **Department of Physics Committees**

2014 Preparer of a promotion case from Associate Professor to Professor  
 2013 - 2014 Chair of the Recruitment and Outreach Committee  
 2013 - 2014 Chair of the Departmental Physics Fest Organizing Committee (departmental workshop that brings together faculty, postdocs, and graduate/undergraduate students in a variety of fields to present research highlights)  
 2012 Preparer of a promotion case from Assistant Professor to Associate Professor  
 2011 - 2012 Chair of a Faculty Search Committee, High Energy Nuclear Physics  
 2010 - 2014 Elected (annually) Member of the Advisory Committee  
 2010 Preparer of a promotion case from Associate Professor to Professor  
 2009 - 2010 Member of the Qualifying Exam Committee  
 2009 - 2011 Member of the Upper Undergraduate Lab Committee  
 2009 Preparer of a promotion case from Assistant Professor to Associate Professor  
 2009 Preparer of an Assistant Professor Mid-probation Review  
 2008 Preparer of a promotion case from Associate Professor to Professor  
 2008 - 2009 Elected Member of the Advisory Committee  
 2008 - 2009 Co-Chair of the Upper Undergraduate Lab Committee  
 2007 - 2008 Chair of a UIC-Fermilab Joint Faculty Search Committee, High Energy Particle Physics  
 2007 - 2008 Member of the Graduate Admissions Committee  
 2007 - 2010 Co-Chair of the Outreach/Quarknet Committee  
 2005 - 2006 Chair of a Faculty Search Committee, High Energy Particle Physics  
 2005 - 2006 Co-Chair of the Upper Undergraduate Laboratory Renovation Committee  
 2005 - 2010 Co-Chair of the Vision Committee  
 2004 - 2005 Chair of a Faculty Search Committee, High Energy Nuclear Physics  
 2004 Preparer of a promotion case from an Assistant Professor to Associate Professor  
 2002 - 2003 Advisor of the Physics Secondary Teacher Education Program  
 2002 - 2003 Co-Chair of the Electronics Shop Committee  
 2001 - 2006 Member of the Graduate Admissions Committee  
 2000 - 2001 Member of the Qualifying Exam Committee  
 1999 - 2005 Member of the Undergraduate Laboratory Renovation Committee  
 1999 - 2001 Co-Chair of the Colloquium Committee  
 1998 - 2000 Member of the Laboratory Review Committee  
 1997 - 1999 Member of the Colloquium Committee

### **Current Research Interests**

My field of research is experimental high energy particle physics. Over the last two decades I have been conducting my research in two leading collaborations at the energy frontier: the CMS experiment, a collaboration of more than 3500 scientists from over 180 institutions in 42 countries at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland, and the DØ experiment, a collaboration of about 650 scientists from over 80 institutions in 18 countries at the Tevatron Collider at Fermi National Accelerator Laboratory (Fermilab) in Batavia, Illinois. My research in CMS and DØ has focused on studies of Quantum Chromodynamics (QCD), the theory that describes the strong interaction responsible for the nuclear force, on searches for more fundamental building blocks of matter beyond the quarks and leptons in the Standard Model, searches

for large extra spatial dimensions, and searches for the Higgs boson and studies of its properties. I have extensive experience on triggering systems for hadron collider experiments, jet reconstruction and calibration, and have previously worked on the Fermilab fixed-target, direct-photon experiment E706, and the axion search experiment E141 at the SLAC National Accelerator Laboratory in Menlo Park, California. I am serving as the co-spokesperson of the Coordinated Theoretical-Experimental Project on QCD (CTEQ) Collaboration, consisting of 37 theorists and experimentalists from 23 institutions in 4 countries who are devoted to a broad program of research projects and cooperative enterprises in particle physics. In addition to research projects, the CTEQ hosts an annual Summer School on QCD Analysis and Phenomenology to promote the understanding of QCD and its proper use among young physicists as well as periodic topical workshops to address current outstanding problems in QCD research.

### **Research Grants**

*Served as PI:*

- PI: Varelas (Co-PIs: Adams, Cavanaugh, Gerber), “Particle Physics Research at the CMS Experiment,” PHY-1306951, National Science Foundation, \$1,365,012, Sept. 2013 – Sept. 2016.
- PI: Varelas (Co-PIs: Adams, Cavanaugh, Gerber), “High Energy Physics Research at Hadron Colliders,” PHY-0969555, National Science Foundation, \$1,621,543, Aug. 2010 – Aug. 2013.
- Lead External Collaborator: Varelas, “Search for New Physics with the CMS and ATLAS Experiments at the LHC,” University of Athens, University of Ioannina, National Technical University of Athens, Greece, euros 600,000, 2012-2015.
- PI: Varelas, Support for LHC Physics Center Senior Fellowship, Fermilab, \$39,500, 2012.
- PI: Varelas (Co-PIs: Adams, Gerber), “Particle Physics Research at Hadron Colliders,” PHY-0653345, National Science Foundation, \$1,292,960, Aug. 2007–Jul. 2010.
- PIs: Varelas and Adams, “Renovation of the Advanced Undergraduate Laboratory Course on Digital Electronics and Nuclear/Particle Physics,” UIC, \$36,000, 2008–2009.
- PI: Varelas, “Funds for the Organization of the 2008 International Linear Collider Workshop: LCWS2008 and ILC2008, University of Illinois at Chicago, Nov. 16-20, 2008,” \$250,000, 2008.
- PI: Varelas (Co-PIs: Adams, Gerber), “Experimental Particle Physics Research at Hadron Colliders,” PHY-0354950, National Science Foundation, \$901,103, Aug. 2004–Jul. 2007.
- PI: Varelas, “Supplementary Support from LHC Physics Center/USCMS,” \$48,000, 2006–2007.
- PI: Varelas, Subcontract from Northern Illinois University for US Linear Collider R&D Projects, National Science Foundation and Department of Energy, \$10,000, May 2003–May 2005.
- PI: Varelas (Co-PIs: Adams, Gerber), “Experimental High Energy Physics at the DØ and CMS Collider Experiments,” National Science Foundation, PHY-0098824, \$770,554, Aug. 2001–Jul. 2004.

- PI: Varelas (Co-PI: Adams), “Experimental High Energy Physics and Development of a Calorimeter Level-2 trigger for the DØ Experiment,” National Science Foundation, PHY-9804320, \$517,915, Aug. 1998–Jul. 2001.
- PI: Varelas, Memorandum of Understanding with Fermilab for the Development of the Level-2 Calorimeter Trigger for the DØ experiment, \$64,000, 1998–2002.

*Served as Co-PI:*

- Co-PI: Varelas (PI: Gerber, other Co-PIs: Adams, Cavanaugh), “Research in High Energy Particle Physics at CMS,” PHY-1606321, National Science Foundation, \$1,817,847, Aug. 2016 – Sept. 2019, pending.
- Co-PI: Varelas (PI: Gerber, other Co-PIs: Apanasevich, Cavanaugh), “USCMS Operations at the LHC,” NSF Cooperative Agreement award to Princeton University, subcontract to UIC, \$243,599, 2017–2021, pending.
- Co-PI: Varelas (PI: Gerber, other Co-PIs: Cavanaugh), “U.S. CMS Phase-1 Upgrades,” NSF Cooperative Agreement proposal, subcontract to University of Nebraska - Lincoln, \$1,026,000, 2014 – 2019.
- Co-PI: Varelas (PI: Gerber, other Co-PIs: Adams, Cavanaugh), “Supplementary Travel Support from U.S. CMS Project,” \$150,000, 2006–2012.
- Co-PI: Varelas (PI: Gerber, other Co-PIs: Adams, Apanasevich, Cavanaugh), “USCMS Operations at the LHC,” NSF Cooperative Agreement award to Princeton University, subcontract to UIC, \$418,892, 2012–2016.
- Co-PI: Varelas (PI: Gerber, other Co-PIs: Adams), “Development of a Silicon Vertex Detector for the Higgs Search at the Tevatron Collider,” Multi-institutional MRI Grant, National Science Foundation, PHY-0116649, Total award: \$1,700,000 (plus \$790,000 matching funds), UIC award: \$160,000 (plus \$16,000 matching funds), 2001–2004.
- Co-PI: Varelas (PI: Adams), “QuarkNet Outreach Program,” NSF/Subcontract from Fermilab, \$30,000, 2000–2003.
- Co-PI: Varelas (PI: Adams), NSF/Subcontract from Northeastern University for US CMS projects, \$342,000, 1999–2001.

### **Research Leadership**

2013 - present	Co-spokesperson of the CTEQ Collaboration
2015 - present	Member of the CMS Higgs Publications Committee
2015	Co-authored a review chapter on <i>Searches for Quark and Lepton Compositeness</i> published in the Review of Particle Physics by the Particle Data Group
2012	Co-convener of the “Hard QCD”, International Workshop on QCD at the LHC, Michigan State University
2011	Invited Summary Plenary Speaker on “QCD: Experiment” at the biennial International Europhysics Conference on High Energy Physics, Grenoble, France
2010 - 2011	Member of the CMS Publications Committee (reviewed about 100 publications)
2010	Co-convener of the “Perturbative QCD, Jets and Diffractive Physics” Track, 35th International Conference on High Energy Physics, Paris, France

2008 - 2009	Co-convener of the CMS QCD Physics Group (about 300 physicists worldwide)
2009	Co-editor of the Proceedings of the 2008 International Linear Collider Workshop
2007 - 2009	Member of the CMS Physics Steering Committee
2007	Co-convener of the CMS Jets and Missing ET Physics Object Group (about 400 physicists worldwide)
2006	Nominated and stood elections for DØ experiment co-spokesperson
2004 - 2006	Trigger Coordinator of the DØ Experiment (Oversaw and coordinated the operations and physics priorities of all Trigger Systems of the experiment, including the integration of the \$5M Run IIb Trigger Upgrade)
2004 - 2006	Member of the DØ Upper Management Board
2003 - 2004	Co-convener of the DØ Higgs Physics Group (about 150 physicists worldwide)
2002 - 2003	Chair of the DØ Trigger Board (Responsible for assigning collaboration-wide priorities of the trigger bandwidth for the entire physics program of the experiment)
2000 - 2001	Co-project Manager of the DØ Trigger Upgrade for Run IIa (about 60 physicists and engineers worked on the \$6M Trigger Upgrade Project)
2000 - 2001	Commissioner of the DØ Level-2 Trigger System
1997 - 2006	Leader of the DØ Level-2 Calorimeter Trigger
1997	Co-convener of the “Physics of the Hadron Final State” Group, International Conference on Deep Inelastic Scattering and QCD
1995 - 1997	Co-convener of the DØ QCD Physics Group (about 100 physicists worldwide)

### **Selected Professional Committees, Editorships, Reviews, and Panels**

2015	Member of the Selection Committee for the Fermilab LHC Physics Center Co-coordinator
2015 - present	Editorial Advisory Board Member of the journal <i>Open Physics</i> (formerly <i>Central European Journal of Physics</i> )
2014 - present	Chair of the CTEQ Wu-Ki Tung Award for Early Career Research on QCD
2014 - present	Member of the Electorate Body/Evaluation Committee for Universities in Greece
2014	Chair of the American Physical Society (APS) Henry Primakoff Award for Early-Career Particle Physics
2013	Vice-Chair of the American Physical Society Henry Primakoff Award for Early-Career Particle Physics
2013	Editorial Review Committee of the APS Division of Particle and Fields Long-Term Planning Report for the U.S. Particle Physics Program
2013	Panelist at the Illinois Science & Technology Coalition Leadership Forum Series organized by U.S. Representatives Hultgren, Lipinski, and Foster on the Capitol Hill
2013	Organizing Committee Member of an event on the Capitol Hill to celebrate the Discovery of the Higgs Boson and Recent Advances in Particle Physics
2012 - 2015	Member of the National User Facility Organization
2012 - 2014	Elected member of the Executive Committee of the American Physical Society Division of Particles and Fields (DPF has about 4000 members)
2011 - 2014	Elected member of the Fermilab Users Executive Committee (UEC) (representing about 2500 members from about 150 universities and national laboratories)
2012 - 2013	Chair of the Fermilab Users Executive Committee
2012 - 2014	Member of the UEC Government Relations Subcommittee at Fermilab
2012 - 2014	Member of the UEC Quality of Life Subcommittee at Fermilab
2011 - 2012	Chair of the UEC Outreach Subcommittee at Fermilab
2012 - present	Editorial Board Member of the journal <i>Modern Physics and Applications</i>

2007 - present      Editorial Board Member of the journal *Advances in High Energy Physics*  
 2009                    Chair of the Local Organizing Committee and Co-Editor of the Proceedings for the  
                               2008 International Linear Collider Workshop at UIC  
 2009                    Member of DOE Proposal Review Panel for the High Energy Physics American Recovery  
                               and Reinvestment Act (ARRA)

Reviewer of grant proposals submitted for funding to the Swiss National Science Foundation

Reviewer of DOE and NSF grant proposals

Reviewer of journal manuscripts published in *Physics Letter B*, *Physical Review Letters*,  
*Physical Review D*, *European Physical Journal*, and *Advances in High Energy Physics*

Chaired numerous physics analysis review committees, technical committees, and review panels  
 at the DØ and CMS experiments.

### **Other Recognition**

- My research on quark substructure was the annual highlight on the NSF Science, Engineering, and Education Innovation web page (2012): <http://goo.gl/3QzJGJ>
- News media articles related to my group’s research:
  - “Measuring Extra Dimensions,” Fermilab Today, December 19, 2014.
  - “Three ways to be invisible,” Fermilab Today, September 19, 2014.
  - “The Higgs gives mass to matter, too” Fermilab Today, July 25, 2014.
  - “Scientists find Predicted Way to Produce Puzzling Particle,” UIC NEWS, March 11, 2014.
  - “A Universal Discovery: The Higgs Boson,” The Ampersand, UIC Honors College, December, 2013.
  - “Thrill of the Unknown,” UIC NEWS, October 22, 2013.
  - “Physicists celebrate Nobel Prize to Higgs boson scientists,” UIC NEWS, October 8, 2013.
  - “Understanding the Search for the Higgs Boson: A Primer for Civilians,” AtLAS, UIC, July 2012.
  - “UIC’s helping hands put Higgs particle within scientists’ grasp,” UIC NEWS, July 11, 2012.
  - “Backscatter Microscopes,” (Search for Quark Compositeness) Fermilab Today, March 16, 2012.
  - “UIC Physicists on Higgs Hunt,” UIC NEWS, December 14, 2011.
  - “LHC @ 7 TeV,” UIC NEWS, April 7, 2010.
  - “UIC @ CMS”, CMS TIMES, November 27, 2006.
  - “When a Z Boson Has Company,” Fermilab Today, January 19, 2006.
  - “Search for the Smallest Constituents of Matter,” UIC TODAY, April 4-5, 2002.



## Postdoctoral Fellow Supervision at UIC

Dr. Zhenbin Wu (2014-present)

Dr. Cosmin Dragoiu (2012, currently a Research Associate at Texas Tech University)

Dr. Leonard Apanasevich (2006-present, currently a Research Assistant Professor at UIC)

Dr. Alan Stone (2003-2006, currently a Program Director at the Office of High Energy Physics at DOE)

Dr. Kostas Papageorgiou (2000-2002, currently an Associate Professor at University of Aegean, Greece)

Dr. Robert Martin (1998-2000, currently Sr. Vice President, Product Development at Apriva, Phoenix, AZ)

Dr. Robert Hirosky (1997-2000, currently a Professor at the University of Virginia)

## Courses Taught

I have taught the following courses multiple times, and have served as course coordinator of the multi-section introductory courses:

- Calculus-based Mechanics (PHYS 141)
- Calculus-based Mechanics for Honors College students (PHYS 141 Honors)
- Calculus-based Electricity-Magnetism-Optics (PHYS 142)
- Calculus-based Electricity-Magnetism-Optics for Honors College students (PHYS 142 Honors)
- Problem-Solving Workshop for General Physics I (Mechanics) (PHYS 144)
- Problem-Solving Workshop for General Physics II (Electricity and Magnetism) (PHYS 145)
- Modern Physics (PHYS 244)
- Physics Research (PHYS 392)
- Classical Mechanics (PHYS 441)
- Advanced Undergraduate/Graduate Laboratory on Digital Electronics and Nuclear/Particle Physics and Instrumentation (PHYS 482/582), which Prof. Adams and I have developed (More information can be found in: <http://www.uic.edu/~varelas/phy482.html>)
- Graduate Level Particle Physics (PHYS 551)

## Textbook Development

With two colleagues at the National Technical University in Athens, Greece, I have been writing a book entitled “Classical Mechanics Problems and Solutions.” To date, we have developed over 500 problems and their solutions, and have created all graphics associated with these problems and solutions. The book covers from Newtonian Mechanics to Lagrangian/Hamiltonian Mechanics and Special Relativity. Editors from several publishing companies have expressed great interest in our book.

## Outreach Activities

- As a member and Chair of the Fermilab Users Executive Committee, I participated in visits to the U.S. Congress in March 2012, 2013, and 2014. Colleagues and I visited more than 300 members of the Congress, the President’s Office of Science and Technology Policy, the Office of Management and Budget, the Secretary of Energy, the Director of Office of Science, and executive officers at DOE and NSF to discuss funding support and future directions of particle physics research.
- Participated at Senator Durbin’s Science Coalition Award, Chicago, March 16, 2015.

- Participated at the National User Facility Organization Exhibition Event for the U.S. House of Representatives, Capitol Hill, June 26, 2013.
- As Chair of the Fermilab Users Executive Committee, I submitted written testimonies to the U.S. House and Senate Water-Energy Appropriations Subcommittees to make the case for sustained funding for fundamental science research within the Department of Energy Office of Science and the National Science Foundation (March 2013).
- Invited panelist at the Illinois Science & Technology Coalition Leadership Forum Series organized by U.S. Representatives Hultgren, Lipinski, and Foster on Capitol Hill, June 25, 2013. The event underscored the importance of partnerships between research universities and national user facilities.
- Strong commitment to outreach programs for high school students and science teachers. Served as co-PI of the QuarkNet program at UIC. The program engages high school teachers, who mostly teach students of color, in summer internships and workshops on particle physics research, aiming at strengthening 6-12 physics education in Chicago, and, thus, enticing more high school graduates to consider pursuing science majors in college.
- Co-hosted high school students' visits to UIC to perform introductory physics laboratory experiments and to participate in summer workshops.
- Presented particle physics seminars to high schools, undergraduate student communities, and public.
- Sponsored UIC undergraduate students to summer research internships at Fermilab.
- Offered tours of Fermilab and the DØ site to high school students and UIC undergraduates.

### **Professional Associations**

American Physical Society (APS)

American Association for the Advancement of Science (AAAS)

Illinois State Academy of Science (ISAS)

European Physical Society (EPS)

Council of Colleges of Arts & Sciences (CCAS)

### **Conference, Workshop, and School Organizer**

Member of the Local Organizing Committee of the “38th International Conference on High Energy Physics,” Chicago, IL, August 3-10, 2016.

Member of the Organizing/Program Committee of the for the 23rd CTEQ Summer School, DESY, Hamburg, Germany, 6 July - 16 July, 2016.

Member of the Organizing/Program Committee of the 22nd CTEQ Summer School, Pittsburgh, Pennsylvania, 7-17 July, 2015.

Member of the Program Committees of the School/Workshop on “Proton Structure in the LHC Era,” DESY, Hamburg, Germany, September 29 - October 2, 2014.

Member of the Organizing and Program Committees of the Fermilab Users Meeting, Fermilab, IL, June 11-12, 2014.

Member of the Organizing/Program Committee of the 21st CTEQ Summer School, University of Peking, Beijing, China, 8-18 July, 2014.

Chair of the Higgs Invited Plenary Session at the APS Meeting, Savannah, Georgia, April 5 - 8, 2014.

Chair of the Instrumentation and Methods Contributed Session at the APS Meeting, Savannah, Georgia, April 5 - 8, 2014.

Chair of the LHC Searches Contributed Sessions at the APS Meeting, Savannah, Georgia, April 5 - 8, 2014.

Chair of the Organizing/Program Committees of the Workshop on “QCD Tools for LHC Physics: From 8 to 14 TeV - What’s needed and why?” Fermilab, IL, November 14-15, 2013.

Member of the Organizing/Program Committee of the 20th CTEQ Summer School, Pittsburgh, Pennsylvania, 7-17 July, 2013.

Chair of the Higgs at LHC Contributed Session at the American Physical Society (APS) Meeting, Denver, Colorado, April 13 - April 16, 2013.

Chair of the Tevatron Higgs and Top Contributed Session at the APS Meeting, Denver, Colorado, April 13 - April 16, 2013.

Chair of the QCD Contributed Session at the APS Meeting, Denver, Colorado, April 13 - April 16, 2013.

Co-Chair of the Symposium in Honor of the Fermilab Director Pier Oddone, Fermilab, IL, June 13, 2013.

Chair of the Organizing and Program Committee of the Fermilab Users Meeting, Fermilab, IL, June 12-13, 2013.

Member of the Organizing and Program Committees of the “Division Particle and Fields Community Planning Meeting,” Fermilab, IL, October 11-13, 2012.

Co-convener of the “Hard QCD” Sessions at the “QCD at LHC” International Workshop, Michigan State University, August 20-24, 2012.

Chair of the “W/Z Production and PDFs” and “Jet Substructure” sessions at the “QCD at LHC” International Workshop, Michigan State University, August 20-24, 2012.

Chair of the QCD Contributed Sessions at the APS Meeting, Atlanta, Georgia, March 31 - April 3, 2012.

Chair of the Higgs Contributed Sessions at the APS Meeting, Atlanta, Georgia, March 31 - April 3, 2012.

Chair of the Higgs Invited Plenary Session at the APS Meeting, Atlanta, Georgia, March 31 - April 3, 2012.

Member of the Organizing and Program Committees of the Fermilab Users Meeting, Fermilab, IL, June 11-13, 2012.

Member of the Organizing and Program Committees of the “7th Annual CERN-Fermilab Hadron Collider Physics Summer School,” Fermilab, IL, August 6-14, 2012

Member of the Organizing/Program Committee of the for the 19th CTEQ Summer School, Lima, Peru, 30 July - 9 August, 2012.

Member of the Organizing Committee of the 18th CTEQ Summer School, Madison, Wisconsin, 10-20 July, 2011.

Chair of Organizing Committee of the Workshop on “Confronting Theory with Experiment: Puzzles, Challenges and Opportunities in the LHC Era,” Fermilab, 17-18 Nov. 2011.

Chair of the “First LHC Physics Results” session at the “Physics at the LHC” Conference, DESY, Germany, June 7-12, 2010.

Chair of the “Photon and Jet Production” session at the “Standard Model Benchmarks at the Tevatron and LHC” Workshop, Fermilab, November 19-20, 2010.

Co-Chair of the Organizing Committee for the Workshop on “Standard Model Benchmarks at the Tevatron and LHC,” Fermilab, November 19 - 20, 2010.

Co-convenor of the “Perturbative QCD, Jets, and Diffractive Physics” Parallel Sessions of the “35th International Conference on High Energy Physics (ICHEP2010),” Paris, France, July 22-28, 2010. Responsible for 200 abstracts and 8 parallel sessions. Chaired 4 of these sessions.

Chair of the Local Organizing Committee for the “2008 International Linear Collider Workshop: LCWS2008 and ILC2008,” University of Illinois at Chicago, Nov. 16-20, 2008. The conference, attended by 400 physicists, consisted of plenary and 13 parallel sessions.

Member of the Program Committee for the “2008 International Linear Collider Workshop (LCWS2008),” University of Illinois at Chicago, Nov. 16-20, 2008.

Co-Chair of the “CMS Jet Algorithms” Workshop, CERN, October 24, 2007.

Member of the Organizing/Program Committee for the 2007 CTEQ Summer School on QCD Analysis and Phenomenology, Madison, Wisconsin, 30 May - 7 June, 2007.

Co-Chair of the Workshop on “Physics at LHC: Early Challenges” at the Kellogg Biological Station, Michigan State University, May 14-15, 2007.

Co-Chair of the “CMS Jet Energy Calibration” Workshop, CERN, April 26, 2007.

Co-Chair of the “CMS Jets” Workshop, CERN, Dec 13-14, 2006.

Principal organizer of the 13th CTEQ Summer School on QCD Analysis and Phenomenology, Rhodes, Greece, July 1 - 9, 2006.

Chair of the Trigger Session at the “DØ Workshop,” Simon Fraser University, Vancouver, Canada, June 12-18, 2005.

Organizer of the “CTEQ/CDF/DØ Workshop on Electroweak Physics,” Fermilab, April 22, 2005.

Member of the Organizing/Program Committee of the 12th CTEQ Summer School on QCD Analysis and Phenomenology, Puebla, Mexico, May 19 - 27, 2005.

Member of the Organizing/Program Committee of the 11th CTEQ Summer School on QCD Analysis and Phenomenology, University of Wisconsin, Madison, June 22 - 30, 2004.

Chair of Organizing/Program Committee of the “DØ Trigger Workshop,” Fermilab, April 10, 2003.

Member of the Organizing/Program Committee of the “9th CTEQ Summer School on QCD Analysis and Phenomenology”, University of Wisconsin, Madison, June 2 - 10, 2002.

Member of the Organizing/Program Committee of the “8th CTEQ Summer School on QCD Analysis and Phenomenology”, St. Andrews, Scotland, June 18 - 26, 2001.

Member of the Organizing/Program Committee of the “7th CTEQ Summer School on QCD Analysis and Phenomenology”, Lake Geneva, Wisconsin, May 30 - June 7, 2000.

Organizer and chair of Trigger sessions of the “DØ Workshop,” Northern Illinois University, DeKalb, Illinois, June 19-23, 2000.

Organizer of the “Level-2 Trigger Upgrade Workshop,” University of Illinois at Chicago, Chicago, Illinois, April 24-25, 1998.

Co-convenor of the “Physics of the Hadron Final State” working group of the 5th International Workshop on Deep Inelastic Scattering and QCD, Chicago, Illinois, April 14-18, 1997.

Organizer and chair of QCD sessions of the “DØ Workshop,” Bloomington, Indiana, July 20-25, 1997.

Organizer and chair of QCD sessions of the “DØ Workshop,” Boston, Massachusetts, June 9-14, 1996.

Principal organizer of the “3rd DØ QCD Workshop,” East Lansing, Michigan, December 15-18, 1996.

Organizer and chair of QCD sessions of the “DØ Workshop,” Ann Arbor, Michigan, June 11-16, 1995.

### **Selected Presentations, Seminars, Colloquia**

“Unlocking the Secret Code of the Cosmos,” College of Liberal Arts and Sciences, University of Illinois at Chicago, March 31, 2015.

“Unlocking the Secrets of our Universe,” Keynote Speaker, Emeritus Faculty Reception, University of Illinois at Chicago, March 18, 2014.

“Unveiling the Mysteries of our Universe,” invited public presentation, Daley Library, University of Illinois at Chicago, February 26, 2014.

“Jet Physics at CMS,” invited presentation, International Conference on New Frontiers in Physics, Kolybari, Crete, Greece, August 28 - September 5, 2013.

“Innovation at National Lab User Facilities,” Panelist, Illinois Science & Technology Leadership Forum Series, Capitol Hill, Washington, D.C., June 25, 2013.

“Fermilab Users Executive Committee Annual Report”, Fermilab Users Meeting, Fermilab, IL, June 12-13, 2013.

“Why we Should be Excited by the Higgs Discovery,” invited public presentation, sponsored by the Hellenic Link-Midwest, Chicago, May 19, 2013.

“Fermilab Users Executive Committee Report”, invited presentation, Fermi Research Alliance Visiting Committee for Scientific Programs, Fermilab, March 28-29, 2013.

“The Modern Greek Crisis and Greek Identity,” Panelist, Greek Identity: The Glory and the Burden of Hellenism, UIC, Nov. 9, 2012.

“Multijet and V+Jet Results from Tevatron and LHC,” invited plenary presentation, International Conference on Multiparticle Dynamics, Kielce, Poland, September 16-21, 2012.

“QCD: Experiment,” invited summary plenary presentation, International Europhysics Conference on High Energy Physics - HEP2011, Grenoble, France, July 21-27, 2011.

“Latest Results from CMS,” seminar, National Technical University, Athens, Greece, August 4, 2010.

“Status of QCD,” invited plenary presentation, 22nd Rencontres de Blois “Particle Physics and Cosmology” Conference, Blois, France, July 15-20, 2010.

“QCD and Electroweak Results from the Tevatron,” invited plenary presentation, Physics at the LHC Conference, DESY, Germany, June 7-12, 2010.

“Prospects for QCD at LHC,” invited plenary presentation of the first CMS data results, Aspen Particle Physics Conference, Aspen, Colorado, January 17-23, 2010.

“QCD Physics at CMS,” presentation, CTEQ Meeting, Northwestern University, November 20-21, 2009.

“Production and Evolution of High Energy Jets,” two lectures, 16th CTEQ Summer School, Madison, Wisconsin, June 24 - July 2, 2009.

“Standard Model and Beyond: From Tevatron to LHC,” colloquium, ETH Zurich, Switzerland, December 3, 2009.

“The QCD Physics Program at CMS,” seminar, Northwestern University, October 5, 2009.

“QCD at CMS,” seminar, University of Virginia, August 26, 2009.

“Dijet Production at  $D\bar{O}$ ,” invited presentation, 17th International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY09), Northeastern University, Boston, June 5-10, 2009.

“QCD at CMS,” seminar, MIT, Boston, June 8, 2009.

“QCD at CMS,” seminar, Los Alamos National Laboratory, April 27, 2009.

- “The QCD Physics Program at CMS,” invited plenary presentation, Northwest Terascale Research Projects - Workshop on Parton Showers and Event Structure at the LHC, University of Oregon, February 23-27, 2009.
- “QCD at LHC Startup,” invited plenary presentation, CMS Workshop, Limassol, Cyprus, June 23-27, 2008.
- “Jets and Missing ET,” invited plenary presentation, LPC Workshop on Early CMS Physics, Fermilab, June 8-9, 2007.
- “Jets and Missing ET,” invited plenary presentation, US CMS Annual Meeting, Caltech, May 4-5, 2007.
- “Search for the Higgs at  $D\bar{0}$ ,” presentation, CTEQ Fall Meeting, Southern Methodist University, Dallas, Dec. 1-2, 2006.
- “Search for the Higgs at the Tevatron,” lecture, 13th CTEQ Summer School on QCD Analysis and Phenomenology, Rhodes, Greece, July 1 - 9, 2006.
- “From Tevatron to LHC,” seminar, Physics Fest, University of Illinois at Chicago, Feb 2, 2006.
- “Standard Model Higgs Searches at the Tevatron,” presentation, CTEQ Meeting, Jefferson Lab, Hampton, Virginia, November 11-12, 2005.
- “Standard Model Higgs Searches at the Tevatron,” invited presentation, International Europhysics Conference on High Energy Physics (HEP 2005), Lisbon, Portugal, July 21 - 27, 2005.
- “Calorimeter Trigger Commissioning,” invited plenary presentation,  $D\bar{0}$  Workshop, Simon Fraser University, Vancouver, Canada, June 12-18, 2005.
- “Introduction to High Energy Jets,” lecture, 12th CTEQ Summer School on QCD Analysis and Phenomenology, Puebla, Mexico, May 19 - 27, 2005.
- “The State of the Trigger,” invited plenary presentation,  $D\bar{0}$  Collaboration Meeting, Fermilab, Batavia, Illinois, March 1-5 2005.
- “Production and Evolution of High Energy Jets - A focused introductory review,” lecture, 11th CTEQ Summer School on QCD Analysis and Phenomenology, University of Wisconsin, Madison, June 22 - 30, 2004.
- “Electroweak and Higgs Physics at  $D\bar{0}$ ,” invited presentation, International Europhysics Conference on High Energy Physics (HEP 2003), Aachen, Germany, July 17 - 23, 2003.
- “Recent  $D\bar{0}$  Results from Run II,” presentation, CTEQ Meeting, University of California, Riverside, October 25-26, 2002.
- “QCD Results from the Tevatron Run I,” invited plenary presentation, IPPP Workshop on Multiparticle Production in QCD Jets, Durham, England, December 12-15, 2001.
- “Status of Level-2 Trigger,” plenary presentation,  $D\bar{0}$  Collaboration Meeting, Fermilab, Batavia, Illinois, November 2001.
- “Level-2 Trigger,” presentation, Director’s Review of the  $D\bar{0}$  Upgrade, Fermilab, Batavia, Illinois, November 2001.

- “Physics with Jets,” lecture, 8th CTEQ Summer School on QCD Analysis and Phenomenology, St Andrews, Scotland, June 18 - 26, 2001.
- “The Level-2 Trigger,” presentation, Director’s Review of the DØ Upgrade, Fermilab, Batavia, Illinois, June 2001.
- “Physics with Jets,” public lecture, QuarkNet Teachers Workshop, University of Illinois at Chicago, June 14 - 29, 2001.
- “Level-2 Trigger Hardware,” plenary presentation, DØ Collaboration Meeting, Fermilab, Batavia, Illinois, April 2001.
- “Commissioning of the Level-2 Trigger,” presentation, All DØ Meeting, Fermilab, Batavia, Illinois, March 2001.
- “Trigger Hardware Upgrade,” plenary presentation, DØ Collaboration Meeting, Fermilab, Batavia, Illinois, August 2000.
- “Level-2 Trigger Hardware and Installation,” plenary presentation, DØ Trigger Workshop, Northern Illinois University, June 2000.
- “Jet Production at DØ,” invited presentation, XXXth International Conference on High Energy Physics, Osaka, Japan, July 27 - August 2, 2000.
- “Jet Physics and Fragmentation,” two lectures, 7th CTEQ Summer School on QCD Analysis and Phenomenology, Lake Geneva, Wisconsin, May 30 - June 7, 2000.
- “Level-2 Trigger Test Stand Facility,” plenary presentation, DØ Trigger Workshop, Northern Illinois University, October 1999.
- “Production of  $W$  and  $Z$  Bosons at the Tevatron,” presentation, International Europhysics Conference on High Energy Physics, Tampere, Finland, July 15-21, 1999.
- “DØ Level-1 and Level-2 Trigger Jet Algorithms,” plenary presentation, DØ Trigger Workshop, Paris, France, March 10-12, 1999.
- “A Summary of Recent Color Coherence Results,” invited plenary presentation, Physics in Collision Conference, Frascati, Italy, June 17-19, 1998.
- “Experimental High Energy Physics,” seminar, Society of Physics Students, University of Illinois at Chicago, March 4, 1998.
- “Level-2 Calorimeter Trigger,” plenary presentation, DØ Trigger Workshop, Northern Illinois University, October 1997.
- “Jets and Color Coherence at DØ,” seminar, University of Rochester, October 7, 1997.
- “QCD Results from DØ,” invited plenary presentation, High Energy Physics International Conference Euroconference on QCD, Montpellier, France, July 3-9, 1997.
- “Probing Strong Interactions down to  $10^{-17}$  cm Scale,” colloquium, University of Illinois at Chicago, Illinois, Dec 3, 1996.
- “Jets in Hadron Colliders,” invited plenary presentation, CTEQ Symposium on Confronting QCD with Experiment: Puzzles and Challenges, Fermilab, November 7-9, 1996.

- “High- $E_T$  Jets from  $D\bar{O}$ ,” presentation, 28th International Conference on High Energy Physics, Warsaw, Poland, July 25-31, 1996.
- “Color Coherence Studies,” plenary presentation,  $D\bar{O}$  Workshop, Boston University, Massachusetts, June 9-14, 1996.
- “Jet Studies at All Rapidities from  $D\bar{O}$ ,” seminar, Argonne National Laboratory, Illinois, May 7, 1996.
- “Jet Studies at All Rapidities from  $D\bar{O}$  and CDF,” invited plenary presentation, XXXIst Rencontres De Moriond on QCD and High Energy Hadronic Interactions, Les Arcs, Savoie, France, March 23-30, 1996.
- “Results on Color Coherence from  $D\bar{O}$ ,” invited plenary presentation, CTEQ Topical Workshop on Collider Physics 95, East Lansing, Michigan, October 27-28, 1995.
- “Results on Soft Gluon Resummation and Color Coherence from  $D\bar{O}$  and CDF,” invited plenary presentation, 10th Topical Workshop on Proton-Antiproton Collider Physics, Fermilab, Batavia, Illinois, May 9-13, 1995.
- “Calibration of the E706 Liquid Argon Electromagnetic Calorimeter,” presentation, 4th International Conference on Advanced Technology and Particle Physics, Como, Italy, October 3-7, 1994.

### **Selected Publications**

I have co-authored more than 900 refereed publications that have produced more than 74,000 citations (h-index=121). My complete publication and citation list can be found on [www.uic.edu/~varelas/research.html](http://www.uic.edu/~varelas/research.html). The following selected publications are the ones for which I was either a primary author or played a significant role.

- [1] K. Hikasa, M. Tanabashi, K. Terashi, and N. Varelas, Review Chapter on *Searches for Quark and Lepton Compositeness*, Review of Particle Physics, Particle Data Group (2015).
- [2] V. Khachatryan *et al.* [CMS Collaboration], “Azimuthal decorrelation of jets widely separated in rapidity in pp collisions at  $\sqrt{s} = 7$  TeV,” submitted to *J. High Energy Physics* (2016); arXiv:1601.06713.
- [3] V. Khachatryan *et al.* [CMS Collaboration], “Measurement of the inclusive jet cross section in pp collisions at  $\sqrt{s} = 2.76$  TeV,” submitted to *Eur. Phys. J. C* (2015); arXiv:1512.06212.
- [4] V. Khachatryan *et al.* [CMS Collaboration], “Search for quark contact interactions and extra spatial dimensions using dijet angular distributions in protonproton collisions at  $\sqrt{s} = 8$  TeV,” *Phys. Lett. B* **746**, 79 (2015) [arXiv:1411.2646].
- [5] V. M. Abazov *et al.* [D0 Collaboration], “Double parton interactions in  $\gamma + 3$  jet and  $\gamma + b/cjet + 2$  jet events in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV,” *Phys. Rev. D* **89**, no. 7, 072006 (2014) [arXiv:1402.1550].
- [6] S. Chatrchyan *et al.* [CMS Collaboration], “Evidence for the direct decay of the 125 GeV Higgs boson to fermions,” *Nature Phys.* **10**, 557 (2014) [arXiv:1401.6527].

- [7] S. Chatrchyan *et al.* [CMS Collaboration], “Search for the standard model Higgs boson produced in association with a  $W$  or a  $Z$  boson and decaying to bottom quarks,” *Phys. Rev. D* **89**, 012003 (2014) [arXiv:1310.3687].
- [8] L. Apanasevich, S. Upadhyay, N. Varelas, D. Whiteson and F. Yu, “Sensitivity of potential future  $pp$  colliders to quark compositeness,” arXiv:1307.7149 (2013).
- [9] S. Chatrchyan *et al.* [CMS Collaboration], “Observation of a new boson with mass near 125 GeV in  $pp$  collisions at  $\sqrt{s} = 7$  and 8 TeV,” *JHEP* **1306**, 081 (2013) [arXiv:1303.4571].
- [10] T. Aaltonen *et al.* [CDF and D0 Collaborations], “Higgs Boson Studies at the Tevatron,” *Phys. Rev. D* **88**, 052014 (2013) [arXiv:1303.6346].
- [11] J. L. Rosner *et al.*, “Planning the Future of U.S. Particle Physics (Snowmass 2013),” arXiv:1401.6075 (2014).
- [12] Y. Gershtein *et al.*, “Working Group Report: New Particles, Forces, and Dimensions,” arXiv:1311.0299 (2013).
- [13] S. Chatrchyan *et al.* [CMS Collaboration], “Event shapes and azimuthal correlations in  $Z +$  jets events in  $pp$  collisions at  $\sqrt{s} = 7$  TeV,” *Phys. Lett. B* **722**, 238 (2013) [arXiv:1301.1646].
- [14] S. Chatrchyan *et al.* [CMS Collaboration], “Search for microscopic black holes in  $pp$  collisions at  $\sqrt{s} = 8$  TeV,” *JHEP* **1307**, 178 (2013) [arXiv:1303.5338].
- [15] S. Chatrchyan *et al.* [CMS Collaboration], “Measurement of the ratio of the inclusive 3-jet cross section to the inclusive 2-jet cross section in  $pp$  collisions at  $\sqrt{s} = 7$  TeV and first determination of the strong coupling constant in the TeV range,” *Eur. Phys. J. C* **73**, 2604 (2013) [arXiv:1304.7498].
- [16] V. M. Abazov *et al.* [D0 Collaboration], “Combined search for the Higgs boson with the D0 experiment,” *Phys. Rev. D* **88**, 052011 (2013) [arXiv:1303.0823].
- [17] S. Chatrchyan *et al.* [CMS Collaboration], “Measurements of differential jet cross sections in proton-proton collisions at  $\sqrt{s} = 7$  TeV with the CMS detector,” *Phys. Rev. D* **87**, 112002 (2013) arXiv:1212.6660.
- [18] S. Chatrchyan *et al.* [CMS Collaboration], “Search for narrow resonances and quantum black holes in inclusive and  $b$ -tagged dijet mass spectra from  $pp$  collisions at  $\sqrt{s} = 7$  TeV,” *JHEP* **1301**, 013 (2013) [arXiv:1210.2387].
- [19] S. Chatrchyan *et al.* [CMS Collaboration], “A New Boson with a Mass of 125 GeV Observed with the CMS Experiment at the Large Hadron Collider,” *Science* **338**, 1569 (2012).
- [20] S. Chatrchyan *et al.* [CMS Collaboration], “Search for the standard model Higgs boson produced in association with  $W$  and  $Z$  bosons in  $pp$  collisions at  $\sqrt{s} = 7$  TeV,” *JHEP* **1211**, 088 (2012) [arXiv:1209.3937].
- [21] V. M. Abazov *et al.* [D0 Collaboration], “Measurement of the ratio of differential cross sections  $\sigma(pp \rightarrow Z + bjet)/\sigma(pp \rightarrow Z + jet)$  in  $pp$  collisions at  $\sqrt{s} = 1.96$  TeV,” *Phys. Rev. D* **87**, 092010 (2013), arXiv:1301.2233.

- [22] V. M. Abazov *et al.* [D0 Collaboration], “Measurement of the combined rapidity and  $p_T$  dependence of dijet azimuthal decorrelations in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV,” Phys. Lett. B **721**, 212 (2013), arXiv:1212.1842.
- [23] V. M. Abazov *et al.* [D0 Collaboration], “Measurement of the ratio of three-jet to two-jet cross sections in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV,” Phys. Lett. B **720**, 6 (2013) [arXiv:1209.1140].
- [24] S. Chatrchyan *et al.* [CMS Collaboration], “Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC,” Phys. Lett. B **716**, 30 (2012) [arXiv:1207.7235].
- [25] S. Chatrchyan *et al.* [CMS Collaboration], “Search for the standard model Higgs boson decaying to bottom quarks in pp collisions at  $\sqrt{s} = 7$  TeV,” Phys. Lett. B **710**, 284 (2012) [arXiv:1202.4195].
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- [27] S. Chatrchyan *et al.* [CMS Collaboration], “Search for quark compositeness in dijet angular distributions from pp collisions at  $\sqrt{s} = 7$  TeV,” JHEP **1205**, 055 (2012) [arXiv:1202.5535].
- [28] S. Chatrchyan *et al.* [CMS Collaboration], “Search for microscopic black holes in pp collisions at  $\sqrt{s} = 7$  TeV,” JHEP **1204**, 061 (2012) [arXiv:1202.6396].
- [29] S. Chatrchyan *et al.* [CMS Collaboration], “Azimuthal anisotropy of charged particles at high transverse momenta in PbPb collisions at  $\sqrt{s_{NN}} = 2.76$  TeV,” Phys. Rev. Lett. **109**, 022301 (2012) [arXiv:1204.1850].
- [30] V. M. Abazov *et al.* [D0 Collaboration], “Measurement of the ratio of three-jet to two-jet cross sections in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV,” Phys. Rev. D **86**, 012009 (2012) [arXiv:1206.0687].
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- [32] T. Aaltonen *et al.* [CDF and D0 Collaborations], “Evidence for a particle produced in association with weak bosons and decaying to a bottom-antibottom quark pair in Higgs boson searches at the Tevatron,” Phys. Rev. Lett. **109**, 071804 (2012) [arXiv:1207.6436].
- [33] V. M. Abazov *et al.* [D0 Collaboration], “Search for the standard model Higgs boson in  $ZH \rightarrow \ell^+\ell^-b\bar{b}$  production with the D0 detector in  $9.7 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV,” Phys. Rev. Lett. **109**, 121803 (2012) [arXiv:1207.5819].
- [34] V. M. Abazov *et al.* [D0 Collaboration], “Search for the standard model Higgs boson in the  $ZH \rightarrow \nu\bar{\nu}b\bar{b}$  channel in  $9.5 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV,” Phys. Lett. B **716**, 285 (2012) [arXiv:1207.5689].
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