

Gabriella Sciolla

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Professional Positions

2015–present Professor of Physics, Brandeis University
2011–2015 Associate Professor, Brandeis University
2003–2011 Assistant and Associate Professor, MIT
2002–2003 Pappalardo Fellow, MIT
2000–2002 Research Scientist, Laboratory for Nuclear Science, MIT
1996–2000 Research Associate, Stanford Linear Accelerator Center

Education

1996 Ph.D., Turin University
1992 Laurea, Turin University

Awards and Honors

2018 Nahum Glatzer Teaching Scholar Award, Brandeis University
2010 Buechner Undergraduate Advising Award, MIT
2007 Cecil and Ida Green Career Development Professorship, MIT
2006 Outstanding Faculty Mentor Award for Undergraduate Research, MIT
2005 Charles E. Reed Faculty Initiatives Fund, MIT

Selected Professional Service

2019–2020 DOE HEP Basic Research Needs Study Group on Detector R&D, Co-convenor
2016–2019 SNOLAB Board of Directors
2017–2019 SNOLAB Science and Technical Review Committee (STRC)
2014–2018 Coordinating Panel on Advanced Detectors (CPAD)
2014–2017 High Energy Physics Advisory Panel (HEPAP)
2015 Committee of Visitors (COV) for the NSF Division of Physics
2010–2014 Fermilab Physics Advisory Committee (PAC)
2011 DPF Task Force on Instrumentation in High Energy Physics
2003–2005 Executive Committee of the SLAC Users Organization (Chair 2003–04)

The Sciolla Research Group

Postdoctoral Scholars

Max Goblirsch	2016–present
Guglielmo Frattari	2021–present
Gaetano Barone	2015–2018, now Research Associate at BNL
Giacomo Artoni	2013–2015, now Assistant Professor at Rome “La Sapienza”
Rozmin Daya	2011–2014, now Senior Machine Learning Engineer at Facebook
James Battat	2008–2010 (MIT Pappalardo Fellow), now Professor at Wellesley College
Denis Dujmic	2007–2008, now Senior Scientist at OSI Systems
Stephen Sekula	2004–2007, now Professor at Southern Methodist University

Graduate Students

Emily Duden	2021–present
Francesca Capocasa	2019–present
Douglas Zenger	2018–present, DOE Science Graduate Research (SCGSR) Fellowship (2021)
Sagar Addepalli	2018–present, Falkoff Graduate School Teaching Prize (2021)
Prajita Bhattarai	2017–present, CERN ATLAS PhD Grant Award (2020)
Jenny Chen	2017–present, Brandeis GSAS Outstanding Graduate Teaching Award (2019)
Zach Schillaci	2016–2021, now Data Scientist in Lausanne, CH, Berko Memorial Prize for Outstanding Graduate Research (2020), SCGSR Fellowship (2018)
Laura Bergsten	2015–2020, now Data Scientist at EQRx; SCGSR Fellowship (2017)
Hannah Herde	2014–2020, now Research Associate at SLAC; US ATLAS Outstanding Graduate Student Award (2018), Brookhaven Women in Science Chasman Scholarship (2017), SCGSR Fellowship (2016), Falkoff and GSAS Teaching Prize (2015)
Alessio Venturini	2012–2016, now Senior Data Scientist at the Adecco Group
Stefano Zambito	2011–2015, now CERN Fellow; US ATLAS Outstanding Graduate Student Award (2015), Falkoff Graduate School Teaching Prize (2014), Berko Memorial Prize for Outstanding Graduate Research (2014)
Eric Fitzgerald	2011–2014, now Data Scientist at Nike
Minliang Zhao	2004–2008, then at Oracle, California
Karsten Koeneke	2004–2007, now Assistant Professor in Freiburg, Germany

Engineers and Technicians

Meny Raviv Moshe	2021–present, Mechanical Technician, stationed at BNL
Richard Studly	2021, Electrical Engineer
Andrei Dushkin	2017–2021, Senior Mechanical Engineer

Funding

Current support for the Sciolla Group comes from the Department of Energy (High-Energy Physics Research Grants for the Energy Frontier), the US-ATLAS HL-LHC Project (ITk), the US-ATLAS ATC (ATLAS center), the US-Israel Binational Science Foundation, the Office of Science Graduate Student Research (SCGSR) program, the CERN & Society Foundation, and Brandeis University.

Research Activity

ATLAS Collaboration (2011–present)

Physics Analysis

2011–present

Higgs: $H \rightarrow ZZ^* \rightarrow 4\ell$ (2012–present)

The Higgs decay to four leptons allows for detailed studies of all Higgs properties thanks to the full reconstruction of the final state and the excellent signal-to-background ratio. My group contributed to nearly every aspects of this effort, including first measurements of Vector Boson Fusion (VBF) production [8], cross section measurements [8], mass measurements [5, 7, 9], and study of CP properties. Present and past members of my group serve(d) as analysis contacts (Herde, Goblirsch, Barone, Artoni), journal paper editors, and group conveners (Goblirsch, Barone, Artoni). Our success in these analyses is deeply rooted in our expertise in Muon Combined Performance. PhD theses: Zambito (2015), Herde (2020).

Higgs: $H \rightarrow WW^* \rightarrow e\nu\mu\nu$ (2017–present)

Thanks to its relatively large rate and clean signature, this channel allows for the most accurate measurement of the Higgs couplings to bosons as well as other properties used to search for physics beyond the Standard Model. Our main contribution is to the study of the VBF production mechanism, and in particular on the fiducial and differential cross-section measurements [4, 6]. This effort takes advantage of a long-term collaboration with BNL through the ATC program. PhD theses: Bergsten (2020), Chen (expected in 2022).

Standard Model: Studies of the 4ℓ spectrum (2017–present)

Evolved from our $H \rightarrow 4\ell$ effort, these measurements have become a major focus of our research toward unveiling New Physics through electroweak precision measurements. Members of my group have led three analyses that measured the 4ℓ differential cross section with increasing precision and served as analysis contact and paper editors for two journal publications [10, 11] (Goblirsch). PhD theses: Schillaci (2021), Bhattarai (in progress).

Dark Matter searches at the LHC (2013–2016)

Weakly-interacting massive particles (WIMPs) can be produced in pairs at the LHC and detected through the “mono-jet” signature characterized by an isolated, energetic jet recoiling against large missing transverse energy. I pioneered a novel search for Dark Matter produced in association with heavy quarks giving rise to final states with missing transverse energy and one or more heavy (b or top) jets. This search is most sensitive to low-mass WIMPs produced in scalar interactions of Dark Matter with quarks [13]. Members of my groups also contributed to the classic mono-jet search in early Run-2 [12]. PhD thesis: Venturini (2016).

Exotics: searches for $Z' \rightarrow \ell\ell$ (2011–2015)

During Run-1 and early Run-2, my group played a leading role in searches for high-mass dilepton resonances [14, 15]. Our expertise in Muon Combined Performance was essential to understand the momentum resolution for the most energetic muons. Members of my group served as analysis contact (Daya) and I served as the editor for several publications stemming from these high-profile results. PhD thesis: Fitzgerald (2014).

Muon Combined Performance (MCP)

2011–2018

I served as MCP convener between 2014 and 2016, at the beginning of Run-2. As such, I reorganized the group’s structure, recruited new talent, and introduced the concept of “Institutional Responsibility” to ensure long-term coverage of the various tasks. I published the first Run-2 ATLAS performance paper in 2016 (with 2,000 citations to date). My group had the institutional responsibility for muon p_T calibration between 2014 and 2018. Three of my former students/postdocs (Zambito, Artoni, Barone) became MCP conveners after me.

Phase-2 Upgrades: ITk Strips Project

2016–present

For the HL-LHC, ATLAS will upgrade its tracking system to an all-silicon Inner Tracker (ITk). The US has committed to deliver half of the ITk barrel strip detector, and my group at Brandeis plays a central role in this effort. We collaborate closely with BNL, where all US-built sensor modules of the ITk detector are collected and assembled into “staves” before being shipped to CERN for installation.

ITk Managerial contributions Over the years, I have served as L3 Manager for Stave Assembly, L3 Manager for Module Assembly, and Deputy L2 Manager. In 2020, I became L2 Manager for the entire US effort, coordinating the activity of 11 institutions, including two National Labs, and responsible for a budget of \$43M.

Technical contributions Three to four Brandeis group members, including students and a technician, are stationed at BNL full-time. They are responsible for the software aspects of the stave assembly process (XYZ stage, surveys, etc.), play a key role in the electrical testing of the staves, and work on module assembly, testing, and metrology. A Brandeis mechanical engineer designed and built precision jigs that position the modules on the stave during assembly.

Track Reconstruction

2017–present

My group contributes to three vital aspects of track reconstruction in ATLAS: characterization of tracking performance in new data sets and new software releases within the Tracking Combined Performance group; improvements in the tracking algorithm producing a factor-2 speed up; future performance studies for the ITk project and key contributions to the ITk software within the Tracking Upgrade group. A member of my group (Goblirsch) also served as Tracking Combined Performance Convener and Upgrade Tracking sub-convener.

Leadership Positions in ATLAS

- 2020–present US ATLAS Level 2 Manager for ITk Strips Project (budget: \$43M)
- 2017–2020 US ATLAS Deputy Level 2 Manager for ITk Strips Project
- 2019–2020 US ATLAS Level 3 Manager for ITk Strips Module Assembly (budget: \$18M)
- 2016–2019 US ATLAS Level 3 Manager for ITk Strips Stave Assembly (budget: \$7M)
- 2017–present ATC (ATLAS Center) University representative for BNL
- 2014–2016 ATLAS Muon Combined Performance Convener (MCP)
- 2013–2020 US ATLAS Physics Advisor (Deputy 2013–2015)
- 2013 Organizer of the Snowmass@CERN group.
- 2013 US ATLAS Tier 3 Task Force (Co-chair).
- 2011-present Member and Chair of several Editorial Boards that oversaw several ATLAS publications in Standard Model, Higgs, Exotics, B Physics, and Detector groups.

DMTPC Collaboration (2007–2010)

In 2007, I co-founded a collaboration for the development of DMTPC [22, 23], a novel Dark Matter directional detector [1, 2, 21]. DMTPC was a low-pressure time projection chamber which used optical readout to achieve a 2-dimensional reconstruction of the nuclear recoils at a low cost per channel. The use of CF_4 as active material made this detector particularly sensitive to spin-dependent interactions.

I was the Principal Investigator for *DMTPCino*, a 1-m^3 DMTPC detector for which I received joint DOE/NSF funding in 2010. I was the main advocate for the experiment within the national and international Dark Matter community and I coordinated the physics reach studies and simulation/reconstruction/calibration group.

My group obtained the first observation of the “head-tail” effect in low energy nuclear recoils [24], a major step forward in directional Dark Matter detection. We also developed a new amplification plane to provide 2-D reconstruction of the nuclear recoils while preserving the “head-tail” capability of the detector and its high gas gain [25] and measured the scintillation properties of CF_4 [26]. The first limit on spin-dependent interactions on protons from a surface run of a 10-liter DMTPC prototype [20] was published in 2011.

BABAR Collaboration (1996-2007)

The BABAR experiment searched for Physics Beyond the Standard Model in B meson decays. Constraints on New Physics could be obtained by a comprehensive study of CP violation in the B system [3] as well as by studying rare B decays such as $b \rightarrow s\gamma$ [27] and $b \rightarrow d\gamma$ [28].

CP Violation in B^0 Decays

2001–2006

I studied CP violation in the B system [3] with particular focus to the measurement of the parameter $\sin 2\beta$ in B^0 decays into charmonium and K_S^0 [30]. My main contribution to this endeavour is in the area of flavor tagging. I coordinated the activities of the B flavor tagging group and developed a new multivariate tagging algorithm that allowed for an improved measurement of the parameter $\sin 2\beta$ [31, 32]. The new algorithm was adopted by the BABAR Collaboration in 2004 and used in more than 25 CP violation publications. I also co-lead the measurement of the CP asymmetry in the decay $B^0 \rightarrow \eta_c K_S^0$ [31].

B Rare Decays: $s \rightarrow d\gamma$ and $b \rightarrow d\gamma$

2005–2008

These decays are mediated by a loop diagram dominated by top quark contributions. They are sensitive to New Physics because new particles could participate in the loop. They also contribute to CP violation measurements because their branching ratios measure the ratio of Cabibbo-Kobayashi-Maskawa elements V_{td}/V_{ts} , which constrains one of the sides of the Unitarity Triangle. In 2005–2007, I led the $B \rightarrow \rho(\omega)\gamma$ analysis effort that yielded the first observation of this decay [28]. Ph.D. thesis: Koeneke (2007). In 2006–2008 I led the measurement of the direct CP asymmetry A_{CP} in the decay $b \rightarrow s\gamma$ [27]. Ph.D. thesis: Zhao (2008).

BABAR Drift Chamber and Commissioning Run

1996–2000

At SLAC, I worked on every aspect of the BABAR Drift Chamber, starting with the construction and operations of the full-length prototype of the detector [36] and development of a test stand for the front-end electronics [37]. I was then responsible for the online calibration system for the readout electronics and the dE/dx calibration during the first year of data taking. I worked on the commissioning of the BABAR Detector as a whole and its online data-acquisition (DAQ) system during the cosmic-ray run and provided training and support to the new BABAR DAQ operators.

Leadership Positions in BABAR

- 2005–2006 BABAR Speakers Bureau (Chair 2005–06).
- 2003–2005 Coordinator of the Flavor Tagging Group.
- 2000–2007 Member and/or Chair of several Analysis Review Committees.

DELPHI Collaboration (1992–1996)

Leading student in the first observation of the Λ_b baryon and measurement of its lifetime and production branching fraction in semileptonic decays using Λl^- [39] and $\Lambda_c^+ l^-$ [40] correlation analyses.

Developed and deployed a new and efficient track search algorithm that combined information from the Inner Detector and the Vertex Detector as a starting point for the pattern recognition.

Teaching

Brandeis (2011–present)

- Physics 15a** Classical Mechanics for Physics majors, textbook: Kleppner and Kolenkow, 10–15 students
- Physics 15b** Electricity and Magnetism for Physics majors, textbook: Purcell, 15–25 students
- Physics 19a** Classical Mechanics Laboratory for advanced students, 80–100 students
- Physics 19b** Electricity and Magnetism Laboratory for advanced students, 80–100 students
- Physics 30a** Electrodynamics, textbook: Griffiths, 12–20 students

MIT (2003–2010)

- Physics 8.022** Electricity and Magnetism for advanced Freshmen, textbook: Purcell, 80–120 students
- Physics 8.02** Electricity and Magnetism, taught in the TEAL (Technology-Enabled Active Learning) format, 100 students per section
- Physics 8.021** Freshmen Electricity and Magnetism, a course I developed for students who did not do well in the interactive environment of Physics 8.02, 80–100 students

Diversity and Inclusion

As scientists and leaders, it is our duty to strive for a more just world, in which every person is given a fair chance to take part in the advancement of scientific knowledge regardless of their background and gender identity.

As the PI of my research group, it has been a privilege to mentor a number of talented women, both at the graduate and undergraduate level. I am proud of my success in attracting female graduate students: 7 out of 14 PhD students in my group so far are women. Their success has been remarkable: they won several DOE research Fellowships and teaching prizes, the CERN ATLAS PhD Grant Award, the US ATLAS Outstanding Graduate Student Award, and the BNL Women in Science Scholarship.

As a professor, I volunteer to teach introductory-level classes and serve as a Faculty Ambassador to get in contact with freshmen early in their career. I make it a point to establish a personal connection with students who are underrepresented in our field, such as women, first-generation students, and minorities. My goal is to make sure that they get good, practical advice when they most need it to maximize their academic and research potential. I help them choose the “right” classes and coach them on how to land their first research opportunity. I help them apply successfully to graduate schools by reviewing their application, selecting the “right” schools, and organizing a Physics GRE lecture series. Many of my undergraduate students were admitted into prestigious graduate programs, some sponsored by NSF Fellowships.

My work as an advisor and research mentor has been recognized at MIT and Brandeis by three mentoring awards.

Media Outreach

- *At MIT, Large Lectures Are Going the Way of the Blackboard*, by S. Rimer, New York Times, Jan 2009.
- *Hunt for Dark Matter*, by K. Bourzac, Technology Review, April 2009.
- *What We Don't Know in Physics*, by K. Bourzac, Technology Review, December 2008.
- *Travelling: Here, there and everywhere*, by N. Savage, Nature 497 (2013) 525, May 2013.
- *What's next for Higgs boson research?* by S. Charley, Symmetry Magazine, July 2014.
- *Atom Smasher Will Renew Hunt for Strange Particles in 2015*, by C.Q. Choi, NBC News, Dec 2014.
- *The Large Hadron Collider is back in action*, by L. Burrows, Futurity.org, Jun 2015.
- *Brandeis goes to the Large Hadron Collider*, by L. Goodman, BrandeisNOW, May 2016.

University Service

Brandeis

2020–2021	Physics Department Faculty Search Committee, High Energy (Chair)
2018–2021	*Committee on Undergraduate Admissions and Financial Aid, (Chair 2019-2021)
2011–2021	Physics Department Graduate Admissions Committee (Chair 2021, 2014)
2015–2021	Brandeis Faculty Ambassador (formerly First Year Faculty Advisor)
2018–2019	*Committee on Diversity, Equity and Inclusion Studies in the US and Difference and Justice in the World
2019	South Street Seminar Guest Speaker, alumni event hosted by the Brandeis President
2016–2018	*Committee for the Support of Teaching
2016–2017	Physics Department Faculty Search Committee, Astronomy
2013–present	Organizer of the Physics GRE preparation class for Brandeis and Wellesley students.
2011–present	Member of the Women in Science at Brandeis; panelist at the “Imposter Syndrome” panel in Sep 2013 and speaker at the kick-off event in Sep 2011.
2011–present	Physics Department Undergraduate Curriculum Committee

* indicates University-wide or School of Arts and Sciences committees.

MIT

2007–2010	Pappalardo Fellowship Executive Committee
2008–2010	Laboratory for Nuclear Science (LNS) Space Allocation Committee
2006–2009	LNS Colloquium Committee (Chair 2007-2009)
2005–2009	LNS Seminar Committee
2007–2009	Member of the MIT Gender Equity Committee
2004, 2008	Graduate Students Admission Committee
2007	MIT Physics Department Head Search Committee
2006	LNS Director Search Committee
2003–2006	Graduate General Exam Committee
2001–2005	LNS Computing Users Committee

Professional Service to the Community

Panelist for DOE and NSF Reviews Early Career SuperPanel, DOE’s Comparative Reviews, NSF’s Experimental Particle Physics (EPP) and Particle Astrophysics (PA/PNA), DOE/NSF Direct Detection Dark Matter panel, NSF Physics Division Committee of Visitors.

Reviewer for DOE Projects and Operations Program CMS Phase-2 Upgrades Project, CMS Operations, and SuperCDMS-SNOLAB Project.

External Reviewer for DOE and NSF Proposals Early Career, DOE’s Comparative Review for HEP and R&D, NSF’s EPP, US-Japan Cooperation Grants, DOE (SCGSR) and NSF Graduate Fellowships.

External Reviewer for Non-US Funding Agencies US-Israel Binational Science Foundation, Swiss National Science Foundation (SNSF), Helmholtz Young Investigators Group, Deutsche Forschungsgemeinschaft (German Research Foundation), Korea Research Foundation, Greek Ministry of Education, ASPERA (European funding agency for Astroparticle Physics).

Reviewer for Physics Journals JHEP, Physical Review D, Nuclear Instruments and Methods in Physics Research Section A (NIM-A), Journal of Instrumentation (JINST), European Physical Journal A.

Selected Publications

Review Papers

- [1] *Directional detection of Dark Matter*, G. Sciolla, Mod. Phys. Lett. A24 (2009) 1793, arXiv:0811.2764 [astro-ph]
- [2] *Gaseous Dark Matter Detectors*, G. Sciolla and C. J. Martoff, New J. Phys. 11 (2009) 105018, arXiv:0905.3675 [astro-ph.IM]
- [3] *Recent measurements of CP violation at the B factories*, G. Sciolla, Mod. Phys. Lett. A18 (2003) 2083, arXiv:hep-ex/0307045

ATLAS Collaboration

Higgs

- [4] *Measurements of gluon fusion and vector-boson-fusion production of the Higgs boson in $H \rightarrow WW^* \rightarrow e\nu\mu\nu$ decays using pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*, March 2021, ATLAS-CONF-2021-014
- [5] *Measurement of the Higgs boson mass in the $H \rightarrow ZZ^* \rightarrow 4\ell$ decay channel with $\sqrt{s} = 13$ TeV pp collisions using the ATLAS detector at the LHC*, April 2020, ATLAS-CONF-2020-005
- [6] *Observation of vector-boson-fusion production Higgs bosons in the $H \rightarrow WW^* \rightarrow e\nu\mu\nu$ decay channel in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*, July 2020, ATLAS-CONF-2020-045
- [7] *Measurement of the Higgs boson mass in the $H \rightarrow ZZ^* \rightarrow 4\ell$ $H \rightarrow \gamma\gamma$ channels with $\sqrt{s}=13$ TeV pp collisions using the ATLAS detector*, Phys. Lett. B784 (2018) 345, arXiv:1806.00242 [hep-ex]
- [8] *Measurements of Higgs boson production and couplings in the four-lepton channel in pp collisions at center-of-mass energies of 7 and 8 TeV with the ATLAS detector*, Phys. Rev. D91 (2015) 012006, arXiv:1408.5191 [hep-ex]
- [9] *Measurement of the Higgs boson mass from the $H \rightarrow \gamma\gamma$ and $H \rightarrow ZZ^{(*)} \rightarrow 4\ell$ channels with the ATLAS detector using 25 fb^{-1} of pp collision data*, Phys. Rev. D90 (2014) 052004, arXiv:1406.3827 [hep-ex]

Standard Model

- [10] *Measurements of differential cross-sections in four-lepton events in 13 TeV proton-proton collisions with the ATLAS detector*, JHEP 07 (2021) 005, arXiv:2103.01918 [hep-ex]
- [11] *Measurement of the four-lepton invariant mass spectrum in 13 TeV proton-proton collisions with the ATLAS detector*, JHEP 04 (2019) 048, arXiv:1902.05892 [hep-ex]

Dark Matter at the LHC

- [12] *Search for new phenomena in final states with an energetic jet and large missing transverse momentum in pp collisions at $\sqrt{s} = 13$ TeV using the ATLAS detector*, Phys. Rev. D94 (2016) 032005, arXiv:1604.07773 [hep-ex]
- [13] *Search for dark matter in events with heavy quarks and missing transverse momentum in pp collisions with the ATLAS detector*, Eur. Phys. J. C75 (2015) 92, arXiv:1410.4031 [hep-ex]

Exotics

- [14] *Search for high-mass new phenomena in the dilepton final state using proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*, Phys. Lett. B761 (2016) 372, arXiv:1607.03669 [hep-ex]

- [15] *Search for high-mass dilepton resonances in pp collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector*, Phys. Rev. D90 (2014) 052005, arXiv:1405.4123 [hep-ex]

Detector

- [16] *The ABC130 barrel module prototyping programme for the ATLAS strip tracker*, L. Poley *et al.*, JINST 15 (2020) 09, P09004, arXiv:2009.03197 [physics.ins-det]
- [17] *Technical Design Report for the ATLAS Inner Tracker Strip Detector*, CERN-LHCC-2017-005, ATLAS-TDR-025
- [18] *Muon reconstruction performance of the ATLAS detector in proton-proton collision data at $\sqrt{s} = 13$ TeV*, Eur. Phys. J. C76 (2016) 292, arXiv:1603.05598 [hep-ex]
- [19] *Measurement of the muon reconstruction performance of the ATLAS detector using 2011 and 2012 LHC proton-proton collision data*, Eur. Phys. J. C74 (2014) 3130, arXiv:1407.3935 [hep-ex]

DMTPC Collaboration

- [20] *First Dark Matter Search Results from a Surface Run of the 10-L DMTPC Directional Dark Matter Detector*, Phys. Lett. B695 (2011) 124, arXiv:1006.2928 [hep-ex]
- [21] *The case for a directional dark matter detector and the status of current experimental efforts*, S. Ahlen *et al.*, Int. J. Mod. Phys. A25 (2010) 1, arXiv:0911.0323 [astro-ph.CO]
- [22] *The DMTPC project*, G. Sciolla *et al.*, J. Phys. Conf. Ser. 179 (2009) 012009, arXiv:0903.3895 [astro-ph]
- [23] *The DMTPC detector*, G. Sciolla *et al.*, PoS IDM2008 (2008) 002, arXiv:0811.2922 [astro-ph]
- [24] *Observation of the ‘head-tail’ effect in nuclear recoils of low-energy neutrons*, D. Dujmic *et al.*, Nucl. Instrum. Meth. A584 (2008) 327, arXiv:0708.2370 [physics.ins-det]
- [25] *Charge amplification concepts for direction-sensitive dark matter detectors*, D. Dujmic *et al.*, Astropart. Phys. 58 (2008) 30, arXiv:0804.4827v2 [astro-ph]
- [26] *A Measurement of photon production in electron avalanches in CF₄* A. Kaboth *et al.*, Nucl. Instrum. Meth. A592 (2008) 63, arXiv:0803.2195 [physics.ins-det]

BABAR Collaboration

- [27] *A measurement of CP asymmetry in $b \rightarrow s\gamma$ using a sum of exclusive final states*, Phys. Rev. Lett. 101 (2008) 171804, arXiv:0805.4796 [hep-ex]
- [28] *Branching fraction measurements of $B^+ \rightarrow \rho^+\gamma$, $B^0 \rightarrow \rho^0\gamma$, and $B^0 \rightarrow \omega\gamma$* , Phys. Rev. Lett. 98 (2007) 151802, arXiv:hep-ex/0612017
- [29] *The mystery of CP violation*, G. Sciolla, Physics@MIT Magazine, 2006–2007 issue, (link)
- [30] *Observation of CP violation in the B^0 meson system*, Phys. Rev. Lett. 87 (2001) 091801, arXiv:hep-ex/0107013
- [31] *Measurement of the CP-violating amplitude $\sin 2\beta$* , Phys. Rev. Lett. 89 (2002) 201802, arXiv:hep-ex/0207042
- [32] *Improved Measurement of Time-Dependent CP Violation in $B^0 \rightarrow c\bar{c}K^{0(*)}$ Decays*, Phys. Rev. Lett. 94 (2005) 161803, arXiv:hep-ex/0408127
- [33] *Measurement of Time-Dependent CP Asymmetry in $B^0 \rightarrow c\bar{c}K^{(*)0}$ Decays*, Phys. Rev. D79 (2009) 072009, arXiv:hep-ex/0902.1708
- [34] *Branching fraction measurements of $B \rightarrow \eta_c K$ decays*, Phys. Rev. D70 (2004) 011101, arXiv:hep-ex/0403007

- [35] *Measurements of the mass and width of the η_c meson and of an $\eta_c(2S)$ candidate*, Phys. Rev. Lett. 92 (2004) 142002, arXiv:hep-ex/0311038
- [36] *The BABAR drift chamber*, G. Sciolla *et al.*, Nucl. Instr. and Meth. A419 (1998) 310, (link)
- [37] *Electronics for the BABAR central drift chamber*, J. Albert *et al.*, IEEE Trans. Nucl. Sci. 46 (1999) 2027, (link)
- [38] *The BABAR drift chamber project*, A. Boucham *et al.*, Nucl. Instr. and Meth. A409 (1998) 46–52, (link)

DELPHI Collaboration

- [39] *Measurement of Λ_b production and lifetime in Z^0 hadronic decays*, Phys. Lett. B311 (1993) 379
- [40] *Lifetime and production rate of beauty baryons from Z decays*, Zeit. Phys. C68 (1995) 375
- [41] *Production of strange B-baryons decaying into Ξ^\mp - ℓ^\mp pairs at LEP*, Zeit. Phys. C68 (1995) 541
- [42] *Determination of the average lifetime of b-baryons*, Zeit. Phys. C71 (1996) 199
- [43] *Production of strange particles in the hadronic decay of the Z^0* , Phys. Lett. B275 (1992) 231

Selected Conference and Workshop Talks

ATLAS

- *Physics at the Energy Frontier post HL-LHC: opportunities and challenges*, CPAD Workshop, Stony Brook, Mar 2021.
- *Higgs and the Energy Frontier Working Group*, DOE BRN Study Workshop on HEP Detector R&D, Rockville, MD, Dec 2019.
- *Recent Highlights from the ATLAS Experiment*, Miami 2017, Fort Lauderdale, Dec 2017.
- *Searches for Dark Matter Particles at the Large Hadron Collider*, The VIII International Symposium on Large TPCs for Low-Energy Rare Event Detection, Paris, Dec 2016.
- *Searches for Dark Matter Particles at the Large Hadron Collider*, Identification of Dark Matter Conference (IDM2016), Sheffield, UK, Jul 2016.
- *Double the Energy, Double the Fun*, Physics Division Colloquium, Argonne National Laboratory, Mar 2016.
- *Measurement of the Higgs couplings at the LHC and constraints on New Physics*, PACIFIC 2014, Sep 2014, Moorea, French Polynesia.
- *Measurement of cross sections and couplings of the Higgs boson in the ZZ decay channel using the ATLAS detector*, ICHEP2014, Valencia (Spain), Jul 2014.
- *Review of the ATLAS Higgs results from Run-1*, APS Invited Talk, Savannah, Apr 2014.
- *Dark Matter and Heavy Quarks in scalar interactions at hadron colliders*, Dark Matter at the LHC Workshop, Chicago, Sep 2013.

Dark Matter Direct Detection

- *Review of Particle and Nuclear Astrophysics*, plenary, CIPANP 2009, San Diego, May 2009.
- *Experimental techniques for WIMP direct detection*, SLAC Summer Institute, Aug 2009.
- *Determination of angles and sides of CKM triangle at the B factories*, plenary, Les Rencontres de Physique de la Vallée d’Aoste, La Thuile, Mar 2009.
- *DMTPC: a new approach to directional Dark Matter detection*, Plenary Talk, 2009 Aspen conference on Dark Matter and Dark Energy, Aspen, Jan 2009.
- *Review of experimental techniques for WIMP direct detection*, SLAC Summer Institute, Aug 2009.

- *Review of Particle and Nuclear Astrophysics*, plenary talk, CIPANP 2009, San Diego, May 2009.
- *Directional detection of Dark Matter*,
Detecting Dark Matter in the Milky Way workshop, Case Western, Mar 2009;
Searching for Dark Matter: a unified approach workshop, Radcliffe, Feb 2009.
- *DMTPC: a new approach to directional Dark Matter detection*,
2009 Aspen winter conference on Dark Matter and Dark Energy, Aspen, Jan 2009 (plenary);
COSMO 08, Madison WI, Aug 2008;
IDM2008: Identification of Dark Matter, Stockholm, Aug 2008;
XXth Rencontres de Blois: Challenges In Particle Astrophysics, Blois, France, May 2008;
Moriond Cosmology, La Thuile, Italy, Mar 2008 (plenary);
UCLA symposium on Dark Matter and Dark Energy (DM08), Feb 2008 (plenary).
- *DMTPC: a TPC with optical readout for directional Dark Matter detection*,
IEEE 2009, Orlando, Oct 2009;
The Fourth International Symposium on Large TPCs for Low Energy Rare Event Detection, Paris,
Dec 2008 (plenary).
- *Directional Dark Matter detection with a low pressure TPC*, CYGNUS 2007, First Workshop on
Directional Detection of Dark Matter, Boulby Underground Laboratory, UK, Jul 2007.

BABAR

- *Determination of angles and sides of CKM triangle at the B factories*, plenary talk, Les Rencontres de Physique de la Vallee d'Aoste, La Thuile, Mar 2009.
- *How well do we know the CKM parameters? An experimental overview*, Plenary Talk, Kaon 2007 (Kaon International Conference), Frascati, Italy, May 2007.
- *Constraints on the Unitarity Triangle from $B \rightarrow \rho/\omega\gamma$ decays*, CKM 2006, Nagoya, Japan, Dec 2006.
- *New Physics potential in radiative penguin decays*, Workshop on Physics at the B Factories with 1 ab⁻¹, SLAC 2006.
- *Beauty in the Standard Model and beyond*, Plenary Talk, CIPANP 2006, Puerto Rico, May 2006.
- *Searching for New Physics at the B factories: Measurements of $\sin(2\beta)$ at BABAR*, Plenary Talk, Beauty 2005, Assisi, Italy, Jun 2005.
- *Beyond CP violation: hadronic physics at BABAR*, Plenary Talk, First Meeting of the APS Topical Group on Hadronic Physics, Fermilab, Oct 2004.
- *Cracking the Unitarity Triangle: B physics at BABAR*, Invited Talk, APS/DPF Annual Meeting, Philadelphia, Apr 2003.
- *Probing New Physics with CP violation: $\sin(2\beta)$ at BABAR*, PHENO 2003, Madison, WI, May 2003.
- *The first physics results from BABAR*, Plenary Talk, International Conference on CP Violation Physics, Ferrara, Italy, Sep 2000.
- *The BABAR Drift Chamber*, 8th Vienna Wirechamber Conference, Vienna, Feb 1998.

DELPHI

- *B Hadron exclusive lifetimes*, III German-Russian Workshop on Theoretical Progress in Heavy Quark Physics, Dubna, May 1996.
- *Observation of excited b hadrons in DELPHI*, 6th International Conference on Hadron Spectroscopy (Hadron 95), Manchester, Jul 1995.

Presentations for the General Public, Lectures at Summer Schools, Miscellanea

- *Understanding Dark Matter: How Particle Accelerators Teach Us about the Universe*, The South Street Seminar Series, alumni event hosted by the Brandeis President, Apr 8, 2019.
- *From Elementary Particles to the Cosmos: Searching for Dark Matter at the LHC*, Dark Matter Summer School (DMSS 2018), University at Albany, SUNY, Jul 2018.
- *Searching for New Physics in Rare B Decays*, Strangeness, Charm and Beauty in Particle Physics, Vera Luth Retirement Symposium, SLAC, Sep 24, 2010.
- *The future of SLAC: why DUSEL*, talk given at “Redefining the role of SLAC as a User Facility”, SLAC, Feb 7, 2008.
- *Shedding Light on the Dark Universe*, MIT Alumni Breakfast, May 6, 2008; Lunch for Junior Faculty in the School of Science at MIT, Nov 14, 2008; AIP Public Lecture for the General MIT Community, MIT, Jan 5, 2009.
- *TEAL: a new approach to undergraduate physics education*, Berkeley, Feb 13, 2009.
- *DMTPC: a new approach to directional Dark Matter detection*, DUSEL Town Meeting, Washington DC, Nov 3, 2007.
- *Challenges and Opportunities of the University Program*, HEPAP Subpanel on the University Grants Program, Feb 8, 2007.
- *The other window on New Physics: CP violation at the B factories*, Lecture given at the New England Particle Physics Students Retreat, Cape Cod, Aug 2006.
- *What’s the matter with anti-matter? A short history of CP violation*, AIP Public Lecture for the General MIT Community, MIT, Jan 24, 2005.
- *CP violation at the B factories: experimental aspects*, Lecture given at the New England Particle Physics Students Retreat, North Woodstock, NH, Aug. 18–22, 2003.
- *Bees, Elephants, Penguins, and the Symmetries of Nature* Second Pappalardo Symposium, MIT, May 2, 2003.