

Professor Abhay L. Deshpande

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Employment & positions:

- Associate Laboratory Director for Nuclear and Particle Physics (NPP) Brookhaven National Lab (interim, July 1, 2024 -)
- State University of NY (SUNY) Distinguished Professor (2021-)
- Founding Director, Center for Frontiers in Nuclear Science (2017-)
- Director, Electron Ion Collider Science, Brookhaven National Lab (2017-)
- Professor, Stony Brook University (2013-2020)
- Director of Undergraduate Studies, Physics & Astronomy (2009-2014)
- Associate Professor with Tenure, Stony Brook University (2008-2012)
- RIKEN-BNL Senior Fellow and Spin Physics Group Leader (2008-2016)
- Assistant Professor & RIKEN Fellow Stony Brook University (2004-2007)
- RIKEN BNL Research Center Fellow (2000-2003)
- Associate Research Scientist & Postdoctoral fellow, Yale University (1995-1999)

Education

- Ph. D. Experimental High Energy Physics, Yale University (1994)
- M.Sc. Physics, Indian Institute of Technology (IIT), Kanpur, India (1987)
- B. Sc. Physics, University of Bombay (1985)

Interests/Research:

- Quantum Chromodynamics (QCD): QCD (structure of visible matter), nucleon spin
- Precision Electro-Weak (EW) & Beyond the Standard Model (BSM) physics
- Science Communication and innovation in teaching
- Diversity, Equity and Inclusivity; Under Representative Minorities (URMs) in STEM

Honors, Awards, Fellowships and honorary Positions

- Distinguished Visiting Professor, IITH, Hyderabad, India (2024-2026)
- Distinguished Visiting Professor, IITK, Kanpur, India (2024-2026)
- Affiliate Member of WPI-SKCM2, U of Hiroshima, Japan (2024-2027)
- Member of the State University of New York, Distinguished Academy (2021 - present)
- Fellow of the American Association for Advancement of Sciences (AAAS) (2021)
- Distinguished Alumnus Award, Indian Institute of Technology, Kanpur, India (2021)
- SUNY Chancellor's Award for Excellence Research & Innovation (2018)
- Founding Chair, The Electron Ion Collider (EIC) Users Group (2016-2017)
- Principle Contact & Organizer of activities for Electron Ion Collider (1999-2016)
- RIKEN (Japan) President's Special Prize for the Study of Nucleon Spin (2015)
- Fellow of the American Physical Society (2014)
- National Academy of Science's Education Fellow in Life Sciences (2013)
- Sr. Fellow & Group Leader of the RIKEN BNL Research Center (spin) (2008-2017)
- Visiting Lecturer, TIFR (2014/5 & 2018/9, IIT Bombay & Kanpur 2012/3 & 2018/9)
- Visiting Lecturer, University of Adelaide, Australia (2014/15)
- Dept. of Physics & Astronomy @ SBU, Meritorious Faculty Award (2005, 07, 09)
- Fellow, RIKEN-BNL Research Center @ Brookhaven National Lab (2000-2007)

- Visiting Fellowship, Japanese Society of Promotion of Science (JSPS)(1998)
- Gibbs Medal (Valedictorian) University of Bombay (1985)

Author of ~500+ publications (562 Citable or to be published)

- InSpire: h-index ~120 (for published papers); Average Citations/paper: 114

Other:

- 550+ colloquia, seminars & invited (& public) talks at international conferences
- Organized 150+ national and international Workshops, and conferences including APS Women in Science (North-East Chapter), Minority Serving Institution students to participate in Research at national labs and universities.
- Int. Advisory Committees of Int. meetings Laboratories, Research Centers (20+)
- 30+ University, College of Science & Departmental Committees at Stony Brook
- 30+ Ph.D. Defense committees departments at Stony Brook
- External reviewer for Columbia, Kyoto & Tokyo University Ph.D. theses
- Reviewer for US (DoE, NSF), UK, French grants and prize funding agencies
- Reviewer for US (PRL, PRD, PRC, Nature), European (EPJC) & Asian (Pramana) Journals

Project Director and Principal Investigator (PI) of Grants and the Group

- BNL Ass. Lab. Dir. NP-HEP Operating Annual budget of ~\$350M
- DOE Nuclear Physics (Medium Energy) Grant (2005-Present, ~\$9M)
 - 12+ postdoctoral fellows, 14+ graduate, 95+ undergraduate researchers
- BNL LDRD/PDs (\$10M+) for R&D, Electron Ion Collider (2001-present)
- Simons Foundation Award \$5M (2018-2028) for Center for Frontiers in Nuclear Science

Scientific Collaboration, Leadership & Initiatives in Scientific Collaborations

- Founding Director of the Center for Frontiers in Nuclear Science (CFNS) (2017-present)
- Initiated “Edward Bouchet Initiative” for Under Rep. Minorities at CFNS (2021-Present)
- ATHENA EIC Detector: Founding Executive Committee Member (2021-present)
- EIC Science Director & Advisor to BNL Management on EIC matters (2017-present)
- The EIC-HERA Initiative @ CFNS: H1 & ZEUS Collaboration at DESY (2020-present)
- US EIC Users Group, Founding Chair of Steering Committee of (2016/17)
- EIC Project and Science: Initiator, contact person/spokesperson (1999-2016)
- PREX/CREX, MOLLER & SoLID Collaborations @Jefferson Laboratory, (2014-present)
- PHENIX Detector Collaboration at BNL (2000-Present) (Physics WG Convener, Run-Coordinator, Member of the Executive Committee)
- IP12 Local Polarimetry Collaboration (at BNL: 1999-2002, Spokesperson)
- ZEUS Collaboration (at DESY: 1998-2003, Spin Physics & Polarimetry WG Coordinator)
- Spin Muon Collaboration (SMC at CERN: 1994-2000, Physics WG Convener, Polarized Target Group Leader)
- E851 Collaboration (at BNL: 1989-1994, Lead Ph.D. student)

Service and Positions in the National & International Organizations/Committees

- Provost’s Diversity Advisory Committee, Stony Brook University
- Diversity Liaison, Department of Physics and Astronomy, Stony Brook University
- Co-Chair, CFNS EIC related QCD Summer School on EIC physics (2019-present)
- Scientific Advisory Committee, RAPID2021: Advanced Radiation Detector & Instrumentation in Nuclear and Particle Physics Experiments
- International Advisory Committee of the CERN’s LHeC Planning (2023-present)
- Chair Line (2021-2024) APS April meeting

- Chair of the DIS2020/DIS2021 International Workshop on Deep Inelastic Scattering and related subjects; Member of the DIS International Advisory Committee (2020-Present)
- Chair Line (2019, 2021, 2023) Electromagnetic Interactions with Nucleons and Nuclei (vice Chair, EINN2019, Chair, EINN2021, and past Chair, EINN2023)
- International Advisory Board of Jet/X-SCAPE Project for Jets@EIC (2020-present)
- International Advisory Board of HEP-USQCD Project (2020-present)
- International Advisory Committees: *Partial List*: MENU (2015-now), HiX (2015-now), Strong QCD (2020-present), International SPIN Symposium (2024-2027)
- Program Committee, APS/JPS Joint Meeting, Hawaii, US, October 2018
- Chair, Symposium on the promotion of Minority Undergraduate Student Research at BNL (2017)
- Special advisor, Director of RIKEN BNL Research Center (2017-2019)
- Advisory Committee for US National Nuclear Physics School, NNPS (2016-2019)
- Nuclear Science Advisory Committee (NSAC, 2014-2017)
- American Physical Society, Fellow Selection Committee (2016-2017)
- The NSAC Long Range Planning (LRP) Committee (2006-2007, 2014-2015)
- Chair, APS Conference of Undergraduate Women in Physics (N.E. Corridor), 2014
- Life Member, American Association for Advancement of Science (2005-present)
- Life Member, American Physical Society (2005-present)
- APS, Division of Nuclear Physics, Program Committee (2005-2008)
- RHIC AGS Users Executive Council (Member: 2005-2008, Chair: 2008-2010)

Timeline: Scientific milestones & contributions

1991-1999 as Graduate Student & postdoctoral fellow

- Ph.D. @ Yale/BNL: Rare Kaon and pion decays measured at BNL. First measurements of $\pi^0 \rightarrow e^+e^-$ (BR: 10^{-8}) and the form factor for flavor changing neutral current via $K^+ \rightarrow \pi^+ e^+ e^-$ (BR: 10^{-7}). Suppressed the ongoing discussions about beyond-the-Standard Model (BSM) possibilities in these decays.
- Associate Research Fellow @ Yale/CERN: Led the SMC polarized target group and then physics working group including the 1st global NLO-QCD analysis of world-data set by an experimental collaboration. Established the quark spin in nucleon is small (25%) and pointed to *gluons* as the potential missing component of the nucleon spin.
- Driven by the above results, joined ZEUS. Helped initiate & contributed to the polarized HERA workshops (1996-1999) at DESY and **led 1st exploratory workshops** for eRHIC (Electron Ion Collider/EIC) 1999/2000 at BNL & Yale.
- First presentation & discussion on eRHIC in the NSAC Long Range Plan 2022

2000-2007 RIKEN Fellow and Junior faculty at Stony Brook

- R&D and commissioning of RHIC polarimeter. Discovery of the principle of RHIC – Local Polarimetry & built two for PHENIX. Proof of principle measurement of double longitudinal asymmetry in π^0 's at RHIC.
- First high-luminosity measurement non-zero asymmetry in neutral pions from 2006 & 2009 datasets and their interpretation for gluon's contribution to the proton from the RHIC spin program.
- Introduced the eRHIC/EIC science in US/World NP community with principal collaborators (R. Milner, P. Paul, G. Garvey): Led the NSAC EIC White Papers & presented EIC at the 2002 & 2007 NSAC LRP. First major eRHIC/EIC publication: Ann. Rev. of Nucl. & Part. Science 2005.
- Coordinated world-wide EIC effort at the NSAC LRP 2007 with BNL & JLab leadership (and R. Milner & R. Ent) which established EIC in the LRP2007 as an "initiative" for the future.

2008-2016 Tenured faculty at Stony Brook

- 1st measurement of $W^{+/-}$ at RHIC with e^{+}/e^{-} (& recently final μ^{+}/μ^{-} data Run 13); and continued high precision measurements of polarized gluons with π^0 's and photons. (with SBU & PHENIX students).
- Led the Electron Ion Collider through the NSAC LRP 2015. Organized the EIC White paper, Chief Editor, with J. Qiu & Z.-E. Meziani, EPJA 52 (2016) 9, 268. Presented EIC at LRP2015 and helped EIC get NSAC support. Established the EIC Users Group 2016 (& its 1st Chair).
- Initiated the SBU's QCD/Spin group's migration from (only) RHIC/Spin activities to Jefferson Lab (PREX2, CREX, MOLLER & SoLID experiment)

2017-Present Faculty at Stony Brook & Center for Frontiers in Nuclear Science

- As Chair of the EICUG Steering Committee organized, steered [EIC through the National Academy Review](#) including presentation of the EIC to the NAS review committee.
- Established SBU research into the spin & parity QCD experiments at Jefferson Lab while continuing research at RHIC/PHENIX (MOLLER, SoLID and PREX-2/CREX).
- Precision e-polarimetry & physics analysis resulted in a PRL on PREX2: A measurement of neutron skin depth in Lead-208 (Pb) nucleus, which has deep implications to the structure of neutron star: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.126.172502>; Recently a measurement on Calcium-48 nucleus led to another PRL.
- Funded by NY State (\$1.3M) and the Simons Foundation (\$5M), setup *Center for Frontiers in Nuclear Science (CFNS)* to support young scientists to work on EIC & related science. Created post doc positions 10 at BNL/SBU and ~7/year jointly with national and international universities and research labs. As of December-2022 ~17 postdoc graduated to tenure track or tenured faculty or staff scientist positions including some prestigious (named) fellowships at US, European and Asian Labs.
- CFNS has evolved in to a highly active Center for high-energy QCD physics for EIC and related science with ~80+ publications and about 12 workshops per year.
- Launched the **Edward Bouchet Initiative for under-represented minority (URM)** students in high-energy QCD at senior undergraduate and graduate school at SBU with 3 national labs & 5 research universities and 7 minority serving institutions (MSI's). Launched a visitor support for Latin American University researchers.
 - NSF Supported IANN-QCD program for Networking in Americas for QCD/EIC.
 - Some positions seeded by CFNS but seeking support from DOE & NSF (\$3.5M).
 - The undergraduate research part of this initiative supported through DOE grant (co-PI, Ml Chiu of BNL, 2021). The first cohort of graduates: 4 (in 2022) joined graduate school at MSU (1), Stony Brook (2) and U of Puerto Rico(1).
- CFNS Led 2nd Detector Effort for the EIC : initiated a world-wide effort to consolidate the prospects of a second detector at the EIC in collaboration with the EIC Users Group steering committee

Selected publications & reports with A. Deshpande's leadership/significant contributions

Electron Ion Collider:

1. Electron Ion Collider: The Next QCD Frontier: Understanding the Glue that binds us all, A. Accardi et al., Eur. Phys. J. A 52 (2016), e-print: 1212.1701 [nucle-ex]. (1500+ citations)
2. Gluons and Quarks at high energies: Distributions, polarization and tomography, D. Boer et al. e-print : 1108.1713 [nucle-th] (850+ citations)

3. Study of fundamental structure of matter with an electron-ion collider (EIC), A. Deshpande et al., *Ann. Rev. Nucl. Part. Sci.* 55 (2005) 165-228. (167 citations)
4. Science Requirements and Detector Concepts for the Electron-Ion Collider, EIC Yellow Report, BNL-220-990-2021-FORE, JLAB-PHY-21-3198, March 2021 (800+ citations)
5. Electron-Ion Collider at BNL, Conceptual Design Report 2021, J. Adam's et al.

PHENIX Collaboration at BNL and related

6. Double helicity asymmetry in inclusive mid-rapidity π^0 production for polarized p+p collisions at $\sqrt{s}=200$ GeV, PHENIX Collaboration, S. S. Adler et al., *Phys. Rev. Lett.* 93 (2004), 202002. (89 citations, 1st measurement at RHIC)
7. Mid-rapidity neutral pion production in proton-proton collisions at $\sqrt{s}=200$ GeV, PHENIX collaboration, S. S. Adler et al., *Phys. Rev. Lett.* 91 (2003) 241803. (384 citations)
8. Inclusive cross section and double helicity asymmetry for π^0 production in p+p collisions at $\sqrt{s}=200$ GeV: implications for the polarized gluon distribution in proton; PHENIX Collaboration, A. Adare et al., *Phys. Rev. D* 76 (2007) 051106. (267 citations)
9. Measurement of direct photon production in p+p collisions at $\sqrt{s}=200$ GeV, PHENIX collaboration, S. S. Adler et al. *Phys. Rev. Lett.* (2007) 012002. (197 citations)
10. Measurement of parity-violating spin asymmetries in $W^{+/-}$ production at mid-rapidity in longitudinally polarized p+p collisions, PHENIX collaboration, A. Adare et al., *PRD* 93 (2016) 5, 051103 (41 citations)
11. Single transverse spin asymmetry in very forward and very backward neutral particle production for polarized proton collisions at $\sqrt{s}=200$ GeV, A. Bazilevsky, A. Deshpande, B.D. Fox et al., *Phys. Rev. Lett. B* 650 (2007) 325-330. (53 cites)
12. Formation of dense partonic matter in relativistic nucleus-nucleus collisions at RHIC, Experimental evaluation by the PHENIX collaboration; A. Adcox et al. *Nucl. Phys. A* 757 (2005) 184-283, e-print nucle-ex/0410003 [nucle-ex]. (3005 citations)

ZEUS Collaboration at DESY:

13. Measurement of neutral current cross section and F2 structure function for deep inelastic e+p scattering at HERA, ZEUS collaboration, S. Chekanov et al., *Eur. Phys. J. C* 21, (2001) 443-471; e-print hep-ex/0105090 [hep-ex] (561 citations)
14. ZEUS Results on measurement and phenomenology of F2 at low-x and low-Q2, ZEUS Collaboration, *Eur. Phys. J. C* 7 (1999) 609-630. E-print hep-ex/9809005 (367 citations)
15. A ZEUS NLO QCD analysis of data on deep inelastic scattering, ZEUS Collaboration, *PRD* 67, (2003) 012007. (343 citations)
16. Measurement of F2 structure function at very low-Q2 at HERA, ZEUS Collaboration, J. Breitweg et al., *Phys. Lett B.* 487 (2000) 53-73. (271 citations)
17. Measurement of deeply virtual Compton scattering at HERA, ZEUS collaboration, S. Chekanov et al., *Phys. Lett. B* 573 (2003) 46-62. (240 citations)

Spin Muon Collaboration (SMC) at CERN

18. Spin asymmetries (A_1) and structure functions g_1 of the proton and deuteron from polarized high-energy muon scattering, Spin Muon Collaboration, B. Adeva et al. *Phys. Rev. D* 58 (1998) 112001. (447 citations)
19. Spin structure of the proton from polarized inclusive deep inelastic muon-proton scattering, Spin Muon Collaboration, D. Adams et al., *Phys. Rev. D* 56, 5330-5358 (425 citations)
20. A new measurement of spin dependent structure function $g_1(x)$ of the deuteron, Spin Muon Collaboration, D. Adams et al. *Phys. Lett. B* 357 (1995) 248-254. (410 citations)
21. Polarized quark distribution in nucleon from semi-inclusive spin asymmetries, Spin Muon Collaboration, B. Adeva et al. , *Phys. Lett. B* 420 (1998) 180-190. (247 citations).

22. Next to Leading Order (NLO) QCD analysis of spin structure function g_1 , Spin Muon Collaboration, B. Adeva et al., Phys. Rev. D58 (1998) 112002, (232 Citations)
23. The spin dependent structure function $g_1(x)$ of deuteron from polarized deep inelastic muon scattering, SMC, D. Adams et al., Phys. Lett. B 386 (1997) 228-248 (171 citations)

500+ talks since 1996

Condensed Summary of talks & lectures in the last 5 years: 2019-2023

2019 Total talks: ~25

- EIC presentations/discussion at the European Strategy Meeting, Grenada.
- Multiple plenary talks on RHIC spin and EIC at conferences
- Colloquia at TIFR, Warsaw, U. Chicago, SBU, FNAL, Tokyo Tech, Syracuse, Cornell U.
- Summer school lectures: GGI (Florence) & US NNPSS U. Tennessee & CFNS (SBU)

2020 Talks ~ 25 (mostly remote due to COVID)

- EIC Presentation at Snowmass2021, Spanish strategic planning meeting, EIC CD review, INFN Planning meeting, AMBER-at-CERN planning meeting
- Multiple plenary talks at: CFNS (EW/BSM@EIC, Pion/Kaon Structure@EIC, INFN, JLab Users Meeting, HQQCD,
- Colloquia & Public talks at IIT Bombay, Universities/Colleges Mumbai, Solapur, India, Temple University, Howard University, CERN, NISER India, BNL-Brownbag lunch for students
- NPR interview “the Science Guy” Bill Nye on EIC Science after EIC site selection

2021 Talks ~25 (all remote)

- Public talks: U. of New Hampshire (National Laboratory Day US DOE), World of Physics at SBU, DOE Pipeline Initiatives for minorities @ FAMU, Finnish Physics Day (Helsinki)
- Other invited talks at varied audiences: in Asia, Europe, US: high-school students, undergraduate students, graduate students, undergraduate & university teachers, QCD experts
- Summer School lectures: US NNPSS 2021, Winter School Indian and Chinese school 2021

2022 Talks ~25 (mostly in-person)

- Invited plenary talk on EIC at INPC2022, Cape Town, SA September 2022; Invited plenary DNP Session Lead talk on EIC, New Orleans, USA October 2022, Invited plenary session talks at EIC-LHC Synergies workshop at CERN/Geneva, July 2022; Invited talk Workshop ECT*/Trento, Italy, July 2022, COMPASS Collaboration Meeting, INPC 2022, , APSNE-UNH, APS Plenary 2022; APCTP at Incheon, South Korea, BARC India, ISER Mohali, India
- Multiple Colloquia on EIC/Science: BNL-Mini Symposium for Undergraduate Students, U. Mass at Amherst, North Carolina State, Rice University, Kansas University, Indiana University; IIT Delhi; NISER Bhubaneswar, India.
- International Summer School Lectures on experimental QCD and EIC at the CFNS 2022

2023 Talks ~ 25 (all in person)

- Invited Talks: EIC Asia Meeting Seoul, SK; CFNS Workshop on MuIC, EPIC meeting at JLab, INT U of Washington, Epiphany Workshop in Krakow, IIT Bombay, India, African Science Congress, George/South Africa, APS/JPS Joint Meeting, Hawaii, EIC Asia Meeting

- in Taipei, EINN2023 at Paphos, Cyprus, 2nd EIC Korea Workshop (remote), EIC 2nd detector WS @ Temple, APS/JPS in Hawaii (Alpha_S at EIC), CFNS Fellows Gathering
- Colloquia and public talks: SUNY Geneseo, SUNY Albany, Duke University, U of Maryland, Mississippi State University, U of Maryland, McGill U. Canada,
 - Summer School Lectures: EIC Summer School CFNS; 1st European Summer School on EIC in Italy, US National Nuclear Summer School, U of California, Riverside.

2024 Talks ~20 (all-in person)

- Overview of CFNS, and preparation for 2nd EIC detector, SBU BNL collaboration meeting, Wang Center, SBU; Invited talks: Nehru Center, Banagluru (public talk), Colloquia at ICTS/Bangaluru, IIT Kanpur, IIT Hyderabad, India, Wayne State University, CFNS Muon Beam Workshop, EIC Workshop at JPARC, APS Meeting at Sacramento, CA, Colloquia at Bilbao and Madrid, Spain, Remote talk at SQCD-VII, Nanjing, INFN Frascati, IUPAP C12 Meeting in Vancouver, BC. Invited talk NN2024, Canada, EIC and Spin Physics at U of Hiroshima.
- Set of graduate lectures in QCD summer school: at CFNS, Stony Brook, European Summer School, Bari, Italy (October) and South American School (November)