MARK S. NEUBAUER

+1(217) 244-3913 ⋄ 411 Loomis Laboratory of Physics ⋄ 1110 W. Green Street, Urbana, IL 61801
msn@illinois.edu ⋄ www.marksneubauer.com ⋄ neubauer-group.github.io

EDUCATION

Ph.D., Physics, University of Pennsylvania 2001
Dissertation: *Evidence for ν_e Flavor Change through Measurement of the ^8B Solar Neutrino Flux at SNO*
Advisor: Dr. Eugene Beier

B.S., Physics, Kutztown University 1994
Graduated *Summa Cum Laude*

PROFESSIONAL APPOINTMENTS

University of Illinois at Urbana-Champaign, Urbana, IL USA

Affiliate Professor	Department of Electrical and Computer Engineering	2019 –
Affiliate Professor	National Center for Supercomputing Applications	2018 –
Professor	Department of Physics	2018 –
Associate Professor	Department of Physics	2013 – 2018
Assistant Professor	Department of Physics	2007 – 2013

University of California at San Diego, La Jolla, CA USA

Postdoctoral Fellow	Department of Physics	2003 – 2007

Massachusetts Institute of Technology, Cambridge, MA USA

Postdoctoral Fellow	Department of Physics	2001 – 2003

HONORS AND AWARDS

Breakthrough Prize in Fundamental Physics 2016
Dean's Award for Excellence in Research (U. Illinois) 2013
Fellow, Center for Advanced Study (U. Illinois) 2012 – 2013
NSF Career Award 2011
Fellow, National Center for Supercomputing Applications 2008 – 2009
Arnold O. Beckman Research Award (U. Illinois) 2007
Member, Sigma Xi (Massachusetts Institute of Technology) 2002
Chairman's Teaching Award (University of Pennsylvania) 1995

SELECTED FUNDING AWARDS

Lead PI	U. Illinois Experimental HEP base grant	DOE	2022 –
PI	Democratizing AI Hardware with an Open-Source AI-Chip Design Toolkit	DPI	2022 –
Co-PI	Accelerated AI Algorithms for Data-Driven Discovery Institute	NSF	2021 –
PI	FAIR Framework for Physics-Inspired Artificial Intelligence in in HEP	DOE	2020 –
PI	U. Illinois ATLAS Phase-II HL-LHC Upgrade	NSF	2020 –
Co-PI	Advancing Science with Accelerated Machine Learning	NSF	2019 –
PI	U. Illinois Institute for Research and Innovation in Software for HEP Award	NSF	2018 –
PI	U. Illinois ATLAS Tier-2 Computing Center Award	NSF	2010 –
PI	Scalable Cyberinfrastucture for AI and Likelihood-Free Inference	NSF	2018 – 2022
PI	Conceptualization of a Software Innovation Institute for HEP	NSF	2015 – 2018
Co-PI	Data and Software Preservation for Open Science	NSF	2012 – 2016
Co-PI	MRI: Development of Ultrafast Tracking Electronics	NSF	2011 – 2017
PI	CAREER: Fast Hardwaree Tracking and Parallel Computing Strategies for Integrated Research, Education, and Outreach in Particle Physics	NSF	2011 – 2017

PUBLICATIONS

Please find a list of my selected publications here and a full list of my publications here.

SCIENCE COLLABORATIONS AND SELECTED APPOINTMENTS

ATLAS Collaboration, CERN Large Hadron Collider, Geneva, Swizterland: 2007 –

- Team Leader, University of Illinois ATLAS Group 2014 –
- Member, US ATLAS Institutional Board 2014 –
- ATLAS Collaboration Board Institute Representative 2014 –
- ATLAS Trigger/DAQ Institute Board Representative 2014 –
- ATLAS Phase-II Upgrade Institutional Representative 2017 –
- Member, ATLAS Event Filter Tracking Heterogenous Commodity Hardware Task Force 2021
- Member, ATLAS Event Filter Tracking Custom Hardware Task Force 2021
- Member, US ATLAS Resource Allocation Committee (US, ATLAS) 2012 – 2017
- Deputy Manager, US ATLAS Physics Support, Software and Computing 2012 – 2015
- Member, US ATLAS Management Advisory Committee 2012 – 2015
- Chair, US ATLAS Tier-3 Computing Implementation Committee 2015
- Member, US ATLAS Tier-3 Study Group 2013
- ATLAS Representative to the OSG Council 2012 -– 2015
- Level-3 Manager, US ATLAS Application Software 2010 – 2012
- Member, US ATLAS Program Management Plan Committee 2009
- Contact Editor for ATLAS Publications: JINST 16 (2021), JHEP 04 (2019), PLB 790 (2019), JHEP 01 (2016), EPJC 75 (2015), PLB 718 (2012), PRL 107 (2011)
- Member, ATLAS Editorial Board for ATLAS Publications: JHEP 06 (2018), PLB 761 (2016), PLB 756 (2016), PRD 92 (2015), PLB 737 (2014), PLB 718 (2013), PLB 712 (2012)

CDF Collaboration, Fermilab Tevatron, Batavia, IL USA: 2001 – 2008

- Convener, Diboson Physics Group 2006 – 2007
- Project Leader, Central Analysis Facility 2002 – 2004

SNO Collaboration, SNOLab, Sudbury, ON Canada: 1996 – 2002

- Trigger System and GPS-based Timing System 1996 – 2001

RESEARCH HIGHLIGHTS

Multi-boson Production as a Probe of New Physics 2007 –

My group has made extensive study of multi-boson (involving W, Z, Higgs boson h) production at hadron colliders:

- Stringent limits on the production of new particles decaying to multi-boson states and constraints on new physics EPJC 80 (2020), JHEP 04 (2019), PRD 100 (2019), PLB 790 (2019), PRD 98 (2018), JHEP 03 (2018) 009, JHEP 03 (2018) 042, PLB 765 (2017), EPJC 77 (2017), JHEP 09 (2016), PLB 755 (2016), JHEP 01 (2016), EPJC 76 (2016), EPJC 75 (2015), JHEP 01 (2015), PLB 737 (2014), PLB 718 (2012), PRL 107 (2011) 231801, PRL 107 (2011) 041802, EPJC 71 (2011)
- First measurement of ZZ production at a hadron collider PRL 100 (2008)
- First observation of WZ production PRL 98 (2007)
- Authored two review articles on electroweak and diboson physics RMP 84 (2012), ARNPS 61 (2011)
- Served as Chapter Editor for a review article on Di-Higgs Production Rev. Phys. 5 (2020)

Higgs Boson Discovery and Measurement 2012, 2015

My group contributed to the Higgs boson discovery PLB 716 (2012) through analysis of the $\ell\nu\ell\nu$ channel, which led to the 2013 Nobel Prize in Physics for its theoretical prediction, and the observation of $h \to WW^{(*)}$ PRD 92 (2015).

Resolution of a b-baryon Lifetime Puzzle 2007

I led an analysis measuring the Λ_b^0 lifetime $\tau(\Lambda_b^0)$ in the exclusive decay $\Lambda_b^0 \to J/\psi\Lambda^0$. At the time of publication PRL 98 (2007), this was the most precise $\tau(\Lambda_b^0)$ measurement and higher than the previous world average by 3.2σ. This measurement resolved the long-standing "Λ_b^0 Lifetime Puzzle" in favor of the early theory calculations of $\tau(\Lambda_b^0)$.

Resolution of the Solar Neutrino Problem 2001

My analysis of ^{8}B solar neutrino data from the Sudbury Neutrino Observatory (SNO) collaboration provided the first direct evidence for ν_e flavor change and resolved the decades-long "Solar Neutrino Problem". The first SNO paper PRL 87 (2001) result was based on my thesis work and led to the 2016 Breakthrough Prize in Fundamental Physics and 2015 Nobel Prize in Physics (A. McDonald, T. Kajita) for the observation of ν_e flavor change.

PROFESSIONAL SERVICE AND LEADERSHIP

Core Member, Illinois Center for Advanced Studies of the Universe 2020 –
Founding Member, Center for Artificial Intelligence Innovation 2019 –
Member of the Executive Committees & Coordination Groups for:

- Accelerated AI Algorithms for Data-Driven Discovery Institute 2021 –
- Fast Machine Learning Laboratory 2019 –
- Institute for Research and Innovation in Software for HEP 2018 –
- HEP Software Foundation 2016 –
- Open Science Grid 2015 –

Guest Associate Editor, Machine Learning and Artificial Intelligence, *Frontiers in Artificial Intelligence* 2021 –
Review Editor, Cloud Computing, *Frontiers in High-Performance Computing* 2022 –
Member, Steering Board, Accelerated AI Algorithms for Data-Driven Discovery Institute 2021 –
Member, Equity & Career Committee, Accelerated AI Algorithms for Data-Driven Discovery Institute 2021 –
Community Engagement Coordinator, Accelerated AI Algorithms for Data-Driven Discovery Institute 2021 –
Blueprint Coordinator, Institute for Research and Innovation in Software for HEP 2018 –
Co-Lead, Snowmass CompF4 Analysis Facilities Topical Group 2022
Member, IceCube Software and Computing Advisory Panel 2021
OSG Resources Manager 2015 – 2017
Co-Editor, HEP Software Foundation Community White Paper 2017
Member, Fermilab Operational Readiness Review Committee 2017
Practice & Experience in Advanced Research Computing (PEARC) Workshop Reviewer 2017
Member, OSG Campus Infrastructures Community Committee 2016
Member, DOE LBNF Software and Computing Review Panel 2014
Chair, Mitsuyoshi Tanaka Dissertation Award Committee (DPF) 2012
Member, Mitsuyoshi Tanaka Dissertation Award Committee (DPF) 2011

SERVICE ON UNIVERSITY COMMITTEES

Member, NCSA Faculty Fellows Selection Committee 2022 –
Member, NCSA Resource Allocation Committee 2020 –
Member, Campus Research Network Architecture Committee 2018 –
Chair, Illinois Campus Cluster Executive Steering Committee 2014 – 2016
Chair, Illinois Campus Cluster Investor Forum 2014 – 2016
Senator, University Campus Senate 2009 – 2011

SERVICE ON COLLEGE COMMITTEES

Member, College Awards Committee 2022 –
Member, Course and Curriculum Committee 2022 –
Member, Distinguished Postdoctoral Fellowship Review Committee 2022 –
Member, Engineering Open House Advisory Committee 2008 – 2018
Member, Research Information Technology Working Group 2014
Member, NSF Major Research Instrumentation Proposal Selection Committee 2010

SERVICE ON DEPARTMENT COMMITTEES

Member, Steering Board on New Courses 2022 –
Undergraduate Academic Advisor/Mentor 2018 –
Faculty Advisor, Society of Physics Students (U. Illinois Chapter) 2008 – 2019
Member, Ph.D. Qualifying Exam Committee 2012, 2018
Chair/Member, Preliminary Exam and Dissertation Committees 2008–09, 2011–12, 2016–17, 2021, 2023
Chair, Department Colloquium 2013
Member, Faculty Search Committee (High Energy Physics) 2013
Member, Faculty Search Committee (Nuclear Physics) 2013
Member, Communications Coordinator Search Committee 2012
Co-Chair, High-Energy Physics Seminar 2009, 2012, 2022
Faculty Leader, Entrepreneurial Leadership in STEM Teaching & Learning 2008 – 2011