

MARK S. NEUBAUER

Office: 411 Loomis Laboratory
Phone: (217) 244-3913
msn@illinois.edu

Department of Physics
1110 West Green Street
Urbana, IL 61801

EDUCATION

- | | | |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| PhD | University of Pennsylvania, Physics
Dissertation: <i>Evidence for Electron Neutrino Flavor Change through Measurement of the 8B Solar Neutrino Flux at SNO</i>
Advisor: Dr. Eugene Beier | June 2001 |
| BS | Kutztown University, Physics
Graduated <i>Summa Cum Laude</i> | May 1994 |

PROFESSIONAL APPOINTMENTS

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|-------------------------------------------------------------------|---------------------------------------------------|-------------|
| <i>University of Illinois at Urbana-Champaign, Urbana, IL USA</i> | | |
| 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 |
| <i>University of California at San Diego, La Jolla, CA USA</i> | | |
| Postdoctoral Fellow | Department of Physics | 2003 – 2007 |
| <i>Massachusetts Institute of Technology, Cambridge, MA USA</i> | | |
| Postdoctoral Fellow | Department of Physics | 2001 – 2003 |

HONORS AND AWARDS

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|-----------------------------------------------------------------|-------------|
| 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 |

PROFESSIONAL SERVICE & LEADERSHIP

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|--------------------------------------------------------------------------------------------------|--------|
| Member, Center for Artificial Intelligence Innovation (NCSA) | 2019 – |
| Executive Committees / Coordination Groups (current) | |
| <i>Science Responds to the COVID-19 Pandemic</i> | 2020 – |
| <i>Fast Machine Learning Laboratory</i> | 2019 – |
| <i>Institute for Research and Innovation in Software for High-Energy Physics</i> | 2018 – |
| <i>High-Energy Physics Software Foundation</i> | 2016 – |
| <i>Open Science Grid</i> | 2015 – |

Workshop Organization (selected)

<i>Fast Machine Learning and Inference (Fermilab)</i>	2019 –
<i>Building Collaborations for Machine Learning (MIT)</i>	2017 –
<i>Practice & Experience in Advanced Research Computing (New Orleans)</i>	2019 –

Research Award Leadership (selected, recent)

Principle Investigator (PI), Illinois Tier-2 Computing Center	2019 –
Co-PI, Advancing Science with Accelerated Machine Learning	2019 –
PI, Scalable Cyberinfrastructure for AI and Likelihood-Free Inference	2018 –
PI, Conceptualization of a Software Innovation Institute for HEP	2015 – 2018
Co-PI, Data and Software Preservation for Open Science	2012 – 2016
Co-PI, MRI: Development of Ultrafast Tracking Electronics for ATLAS	2011 – 2017

RESEARCH HIGHLIGHTS

Diboson Production as a Sensitive Probe of New Physics 2007 –

My group is at the forefront of studying diboson production at colliders, producing:

- Stringent limits on production of new particles decaying to heavy boson pairs (WW , WZ , ZZ , hW , hZ) and constraints on new physics at the LHC [[PRD 98 \(2018\)](#), [JHEP 1803 \(2018\)](#), [PLB 765 \(2017\)](#), [JHEP 1609 \(2016\)](#), [PLB 755 \(2016\)](#), [JHEP 1601 \(2016\)](#), [EPJC 76 \(2015\)](#), [EPJC 75 \(2015\)](#), [JHEP 1501 \(2015\)](#), [PLB 737 \(2014\)](#), [PLB 718 \(2012\)](#), [PRL 107 \(2011\)](#)]
- First measurement of ZZ at a hadron collider [[PRL 100 \(2008\) 201801](#)]
- First observation of WZ production [[PRL 98 \(2007\) 161801](#)]

I have also authored two review articles on tests of electroweak physics [[RMP 84 \(2012\) 1477](#)] and diboson physics at colliders [[ARNPS 61 \(2011\) 223](#)]

Higgs Boson Discovery 2012

The ATLAS and CMS experiments announced the discovery of a Higgs boson h . This discovery lead to the [2013 Nobel Prize in Physics](#) for its theoretical prediction

- My group contributed to this discovery [[PLB 716 \(2012\) 1](#)] through analysis of the $h \rightarrow WW^* \rightarrow e\nu\mu\nu$ channel and $h \rightarrow WW^*$ observation [[PRD 92 \(2015\) 012006](#)], providing the most precise channel measurement of h couplings.

Resolution of a b -baryon Lifetime Puzzle 2007

On CDF, I lead an analysis of $\tau(\Lambda_b)$ in exclusive decay $\Lambda_b \rightarrow J/\psi \Lambda$. At the time of publication [[PRL 98 \(2007\) 122001](#)], this was the single most precise measurement of $\tau(\Lambda_b)$ and higher than the previous world average by 3.2σ . Our measurement resolved the “ Λ_b Lifetime Puzzle” in favor of earlier theory calculations of $\tau(\Lambda_b)$.

Resolution of the Solar Neutrino Problem 2001

On the SNO experiment, my analysis of 8B solar neutrino data provided first direct evidence for ν_e flavor change, resolving the decades-long “Solar Neutrino Problem”. The first SNO paper [[PRL 87 \(2001\) 71301](#)] was based on my thesis work and lead to the [2016 Breakthrough Prize in Fundamental Physics](#) and the [2015 Nobel Prize in Physics](#) (A. McDonald and T. Kajita) for observation of ν_e flavor change at SNO.

PUBLICATIONS

Please find a list of publications [here](#), including a list of my selected publications.