

# MARK S. NEUBAUER

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Department of Physics  
1110 West Green Street  
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## EDUCATION

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<b>PhD</b>	University of Pennsylvania, Physics Dissertation: <i>Evidence for Electron Neutrino Flavor Change through Measurement of the <math>^8\text{B}</math> Solar Neutrino Flux at SNO</i> Advisor: Dr. Eugene Beier	2001
<b>BS</b>	Kutztown University, Physics Graduated <i>Summa Cum Laude</i>	1994

## PROFESSIONAL APPOINTMENTS

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<i>University of Illinois at Urbana-Champaign, Urbana, IL USA</i>		
<b>Affiliate Professor</b>	Department of Electrical and Computer Engineering	2019 –
<b>Affiliate Professor</b>	National Center for Supercomputing Applications	2018 –
<b>Professor</b>	Department of Physics	2018 –
<b>Associate Professor</b>	Department of Physics	2013 – 2018
<b>Assistant Professor</b>	Department of Physics	2007 – 2013
<i>University of California at San Diego, La Jolla, CA USA</i>		
<b>Postdoctoral Fellow</b>	Department of Physics	2003 – 2007
<i>Massachusetts Institute of Technology, Cambridge, MA USA</i>		
<b>Postdoctoral Fellow</b>	Department of Physics	2001 – 2003

## HONORS AND AWARDS

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

## PROFESSIONAL SERVICE AND LEADERSHIP

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Core Member, <b>Illinois Center for Advanced Studies of the Universe</b> (Physics)	2020 –
Founding Member, <b>Center for Artificial Intelligence Innovation</b> (NCSA)	2019 –
<b>Executive Committee / Coordination Group Member</b> (current)	
<a href="#">Accelerated Artificial Intelligence Algorithms for Data-Driven Discovery Institute</a>	2021 –
<a href="#">Fast Machine Learning Laboratory</a>	2019 –
<a href="#">Institute for Research and Innovation in Software for High-Energy Physics</a>	2018 –
<a href="#">High-Energy Physics Software Foundation</a>	2016 –
<a href="#">Open Science Grid</a>	2015 –

## LEADERSHIP IN FEDERALLY FUNDED RESEARCH AWARDS (RECENT)

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PI	Illinois High Energy Physics base grant (DOE)	2022 –
Co-PI	<a href="#">Accelerated AI Algorithms for Data-Driven Discovery Institute</a> (NSF)	2021 –
Co-PI	<a href="#">FAIR for Data and Artificial Intelligence Models in HEP</a> (DOE)	2020 –
PI	<a href="#">Illinois Tier-2 Computing Center</a> (NSF)	2019 –
Co-PI	<a href="#">Advancing Science with Accelerated Machine Learning</a> (NSF)	2019 –
PI	<a href="#">Scalable Cyberinfrastructure for AI and Likelihood-Free Inference</a> (NSF)	2018 –
PI	<a href="#">Conceptualization of a Software Innovation Institute for HEP</a> (NSF)	2015 – 2018
Co-PI	<a href="#">Data and Software Preservation for Open Science</a> (NSF)	2012 – 2016
Co-PI	<a href="#">MRI: Development of Ultrafast Tracking Electronics</a> (NSF)	2011 – 2017

## APS SERVICE / MEMBERSHIP

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Member, American Physical Society	2007 –
Mitsuyoshi Tanaka Dissertation Award Committee	2011 (Member), 2012 (Chair)
Faculty Advisor, Society of Physics Students	2008 – 2019

## RESEARCH HIGHLIGHTS

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### **Diboson Production as a Probe of New Physics** [ATLAS, CDF experiments] 2007 –

My group is at the forefront of studying diboson production (W, Z, Higgs pairs) at colliders:

- Stringent limits on the production of new particles decaying to heavy boson pairs and constraints on new physics [[PRD 100 \(2019\)](#), [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](#)]
- Review articles on electroweak physics [[RMP 84 \(2012\) 1477](#), [ARNPS 61 \(2011\) 223](#)]
- Chapter Editor for Review on Di-Higgs Production [[Rev. Phys. 5 \(2020\) 100045](#)]

### **Higgs Boson Discovery and Measurement** [ATLAS experiment] 2012, 2015

My group contributed to the Higgs boson  $h$  discovery [[PLB 716 \(2012\) 1](#)] in 2012 and  $h \rightarrow WW^*$  observation [[PRD 92 \(2015\) 012006](#)] in 2015 through analysis of the dilepton channel. This discovery led to the [2013 Nobel Prize in Physics](#) for its theoretical prediction

### **Resolution of a $b$ -baryon Lifetime Puzzle** [CDF experiment] 2007

I led an analysis measuring the  $\Lambda_b$  lifetime  $\tau(\Lambda_b)$  in the exclusive decay  $\Lambda_b \rightarrow J/\psi \Lambda^0$ . 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  $3.2\sigma$ . This measurement resolved the long-standing “ $\Lambda_b$  Lifetime Puzzle” in favor of the early theoretical calculations of  $\tau(\Lambda_b)$ .

### **Resolution of the Solar Neutrino Problem** [SNO experiment] 2001

My analysis of  $^8\text{B}$  solar  $\nu$  data provided first direct evidence for  $\nu_e$  flavor change and resolved the decades-long “Solar Neutrino Problem”. The first SNO paper [[PRL 87 \(2001\) 71301](#)] 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 observation of  $\nu_e$  flavor change.

## PUBLICATIONS

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Please find a list of my selected publications [here](#) and a full list of my publications [here](#).