

Joseph Zennamo

Curriculum Vitae

Home Institution: University of Chicago, Enrico Fermi Institute
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Employment

- Postdoctoral Scholar, University of Chicago, Enrico Fermi Institute (Nov. 2013-present)
Supervisor: Asst. Prof. David W. Schmitz

Education

- Ph.D. in Experimental High Energy Physics, State University of New York at Buffalo (2010-2013)
Ph.D. Thesis Title: *Studies of Z boson production in association with heavy quark jets at $D\bar{O}$*
Advisor: Prof. Avto Kharchilava
- M.Sc. in Experimental High Energy Physics, State University of New York at Buffalo (2008-2009)
M.Sc. Thesis Title: *Validation of the CMS event generators*
Advisor: Prof. Avto Kharchilava
Awarded Om & Saraswati Bahethi Scholarship

Postdoctoral Research Experience

- **MicroBooNE Oscillation Analyses** - (Jan. 2015 - present)
Leading the group performing the flagship MicroBooNE analysis that involves studying the source of the MiniBooNE low energy excess. This involves organizing a large group of researchers to search for anomalous excesses in either electron neutrino events or neutral current single photon events. These analyses require finalizing the first fully automated event and object reconstruction in a liquid argon time projection chamber (TPC), a carefully tuned event selection, and full systematic uncertainty estimation. This is a multi-year effort that will culminate at the end of MicroBooNE data taking.
- **Short-Baseline Neutrino Program Proposal** - (Jan. 2014 - Jan. 2015)
Organized the efforts of three collaborations, the Short-Baseline Neutrino Program, to define the program's sensitivity to sterile neutrino oscillations. Estimating the sensitivity of this program required careful consideration of all possible backgrounds and systematic uncertainties for two possible channels: $\nu_\mu \rightarrow \nu_e$ appearance and ν_μ disappearance. These studies directly impacted the design of the experimental program. The resulting proposal was presented to the Fermilab Physics Advisory Committee, which recommended approval of the Short-Baseline Neutrino Program. The Fermilab Directorate granted Stage 1 approval in Feb. 2015.
- **Liquid Argon Time Projection Chamber R&D** - (Feb. 2014 - June 2014)
Led the research effort to eliminate the threat of electric breakdowns damaging delicate components in cryogenic TPCs. Specifically investigating how surge arrestors performed in cryogenic environments. This involved repeatedly clamping the devices with high energy and high voltage pulses as would be expected inside a liquid argon TPC during catastrophic over-voltage conditions. This work led to the installation of varistors inside MicroBooNE.

- **Preliminary Short-Baseline Near Detector Design** - (Nov. 2013 - Jan. 2014)
Worked to finalize the conceptual design of the Short-Baseline Near Detector (SBND), then known as LAr1-ND, including defining the final dimensions of the detector, and studying the usefulness of a muon-range stack or the magnetization of the inner volume. In addition, performed a preliminary muon neutrino disappearance sensitivity analysis with SBND and MicroBooNE. This included the full event selection and modeling energy resolution effects of contained and exiting muon tracks.

Leadership Positions

- Convener, MicroBooNE Oscillation Group (Jan. 2015 - present)
- Convener, SBND Physics Analysis Group (Aug. 2014 - present)
- Convener, DØ *b*-quark Jet Identification Group (June 2013 - present)

Publications

Co-author of 82 publications by the DØ Collaboration and 18 publications by the CMS Collaboration.
(For full list see attached publication list)

Publications with the most significant contributions:

- **“A Proposal for a Three Detector Short-Baseline Neutrino Oscillation Program in the Fermilab Booster Neutrino Beam”**
M. Antonello *et al.* [MicroBooNE, LAr1-ND, and ICARUS-WA104 Collaborations],
[arXiv:1503.01520](https://arxiv.org/abs/1503.01520) [physics.ins-det].
<http://arxiv.org/abs/1503.01520>
- **“Testing of High Voltage Surge Protection Devices for Use in Liquid Argon TPC Detectors”**
J. Asaadi, J. M. Conrad, S. Gollapinni, B. J. P. Jones, H. Jostlein, J. M. St. John, T. Strauss, S. Wolbers, and J. Zennamo,
JINST **9**, P09002 (2014).
<http://iopscience.iop.org/1748-0221/9/09/P09002/>
- **“Improved *b* quark jet identification at the D0 experiment”**
V. M. Abazov *et al.* [D0 Collaboration],
Nucl. Instrum. Meth. A **763**, 290 (2014).
- **“Measurement of associated production of Z bosons with charm quark jets in *p* \bar{p} collisions at $\sqrt{s} = 1.96$ TeV”**
V. M. Abazov *et al.* [D0 Collaboration],
Phys. Rev. Lett. **112**, 042001 (2014).
<http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.112.042001>
- **“LAr1-ND: Testing Neutrino Anomalies with Multiple LArTPC Detectors at Fermilab”**
C. Adams *et al.* [LArTPC Collaboration],
[arXiv:1309.7987](https://arxiv.org/abs/1309.7987) [physics.ins-det].
- **“Measurement of the ratio of differential cross sections $\sigma(p\bar{p} \rightarrow Z + b \text{ jet})/\sigma(p\bar{p} \rightarrow Z + \text{jet})$ in *p* \bar{p} collisions at $\sqrt{s} = 1.96$ TeV”**
V. M. Abazov *et al.* [D0 Collaboration],
Phys. Rev. D **87**, 092010 (2013).

Conference Talks and Posters

- “The Short-Baseline Neutrino Program”,
48th Fermilab Users’ Meeting, Batavia, Illinois (June 9 - June 11, 2015).
- “Liquid Argon TPCs as Neutrino Detectors”, **Invited**,
IceCube Particle Astrophysics Symposium, Madison, Wisconsin (May 4 - May 6, 2015).
- “Muon Neutrino Disappearance with the Fermilab Short-Baseline Neutrino Program”, **Poster**,
47th Fermilab Users’ Meeting, Batavia, Illinois (June 11 - June 12, 2014).
- “Muon Neutrino Disappearance with MicroBooNE and LAr1-ND”, **Poster**,
XXVI International Conference on Neutrino Physics and Astrophysics (Neutrino2014),
Boston, Massachusetts (June 2 - June 7 2014).
- “Fermilab Short-Baseline Neutrino Program”,
52nd International School of Subnuclear Physics, Erice, Italy (June 24 - July 3 2014).
Awarded “Best New Talent” and Bruno Zumino Scholarship.
- “Identification of heavy flavor jets at $D\bar{0}$ ”,
51st International School of Subnuclear Physics, Erice, Italy, (June 24 - July 3, 2013).
Awarded “Seymour Lindenbaum Diploma”.
- “Measurement of the ratio of differential cross sections $\sigma(Z + b)/\sigma(Z + \text{jet})$ at $D\bar{0}$ ”, **Poster**,
Fermilab Users’ Meeting, Batavia, Illinois (June 12 - June 13, 2013).
- “Measurement of Z boson production in association with heavy flavor jets at $D\bar{0}$ ”,
New Perspectives, Batavia, Illinois (June 10 - June 11, 2013).
- “Measurement of Z boson production in association with heavy flavor jets at $D\bar{0}$ ”,
APS April Meeting, Denver, Colorado, (Apr. 13 - Apr. 16, 2013).
- “Measurements of the ratio of differential cross sections $\sigma(Z + b \text{ jets})/\sigma(Z + \text{jets})$ at $D\bar{0}$ ”,
Lake Louise Winter Institute, Lake Louise, Alberta, (Feb. 17 - Feb. 23, 2013).
- “Measurement of Z boson production in association with heavy flavor jets at $D\bar{0}$ ”,
APS April Meeting, Atlanta, Georgia, (Mar. 31 - Apr. 3, 2012).
- “Measurement of $\sigma(Z + b)/\sigma(Z + \text{jet})$ with $D\bar{0}$ ”, **Poster**,
Fermilab Users’ Meeting, Batavia, Illinois (June 1-2, 2011).
- “Measurement of $Z + b$ jet production at $D\bar{0}$ ”,
APS April Meeting, Anaheim, California, (Apr. 30 - May 3, 2011).

Seminars

- “Searching for Sterile Neutrinos with the Fermilab Short-Baseline Neutrino Program”,
HEP Seminar, Indiana University, Bloomington, Indiana (October 26, 2015).
- “Discovering the Undetectable: Sterile Neutrinos and the Fermilab Short-Baseline Program”,
Physics Dept. Seminar, State University of New York at Buffalo, Buffalo, New York (Sept. 29, 2015).
- “Searching for Sterile Neutrinos with the Fermilab Short-Baseline Neutrino Program”,
HEP Division Lunch Seminar, Argonne National Laboratory, Lemont, Illinois (April 14, 2015).
- “Searching for Sterile Neutrinos with the Fermilab Short-Baseline Neutrino Program”,
High Energy Physics Lunch Seminar Series, University of Chicago, Chicago, Illinois (Feb. 9, 2015).

- “Searching for Sterile Neutrinos with the Fermilab Short-Baseline Neutrino Program”, Weak Interaction Discussion Group, Yale University, New Haven, Connecticut (Dec. 9, 2014).

Outreach

- Participated in the “2014 Fermilab Physics Slam”, presenting a short lecture entitled “The Weird and Wonderful World of Neutrinos”. Ranked second by crowd applause.
- Act as a tour guide for University groups who visit Fermilab and individuals interested in pursuing studies in high energy particle physics.
- Officer of the Fermilab Graduate Student Association (2011-2012) and organized the 2012 New Perspectives conference and Users’ Meeting poster session, setup various outreach activities for the graduate students at Fermilab, and worked with the Users’ Executive Committee and Directorate to setup the new Fermilab Student and Postdoc Association.

Mentoring

- Marina David (Ohio State University, Undergraduate), Summer 2015.
- Davio Cianci (University of Chicago, Undergraduate), Summer 2014.