Zoya Vallari

Postdoctoral Scholar **[Jan 2019 - Present]**
Physics, Math & Astronomy Division WEBSITE : zoyavallari.com
California Institute of Technology EMAIL : zoya@caltech.edu
Pasadena, United States 344 Lauritsen, MC 356-48

EDUCATION

Stony Brook University Stony Brook, NY
PhD Particle Physics [Aug 2012 - Dec 2018]
Adviser: Prof. Chang Kee Jung
Dissertation: Measurement of Single π^0 Production in Neutral Current Neutrino Interactions on Water at the Near Detector of the T2K experiment

Indian Institute of Technology Bombay Mumbai, India
Master of Science (M.Sc), Physics [July 2010 - Aug 2012]

St. Stephen's College, Delhi University New Delhi, India
Bachelor of Science (B.Sc), Physics Hons [July 2007 - May 2010]

RESEARCH SUMMARY

Neutrinos are one of the fundamental particles from which the universe is built. They are highly elusive as they only interact via weak force. Neutrinos come in three flavors and oscillate from one kind to another depending on their energy and the distance traveled. The flagship US experiments that I work on (NOvA and DUNE) study this property of neutrino oscillation. The first successful measurement of neutrino oscillation was awarded the Nobel Prize in 2015. Precise measurement of the oscillation parameters give us insight about the fundamental physics theories which govern how particles interact with each other. Just after Big Bang, for every billion matter-antimatter pairs, there was one extra matter particle. Equal number of matter-antimatter would annihilate each other to form energy leaving nothing else in the Universe. The reason for this tiny excess of matter particles that create the universe is yet-unknown. Measuring neutrino oscillation precisely could provide us with hints to solve the matter-antimatter asymmetry.

SELECTED PUBLICATIONS

- *An Improved Measurement of Neutrino Oscillation Parameters by the NOvA Experiment*
  M. A. Acero et al (NOvA Collaboration); arXiv:2108.08219; Phys Rev D.106.032004 (2022)

- *Long-baseline neutrino oscillation physics potential of the DUNE experiment*
  B. Abi et al (DUNE Collaboration); arXiv:2006.16043; European Physics Journal C 80, 978 (2020)

- *Adjusting neutrino interaction models and evaluating uncertainties using NOvA near detector data*

M. A. Acero et al (NOvA Collaboration);arXiv:2006.08727; European Physical Journal C 80 (12) (2020)

- *Constraint on the Matter-Antimatter Symmetry-Violating Phase in Neutrino Oscillations*
  K. Abe et al (T2K Collaboration); arXiv:1910.03887; Nature 580, 305 (2020)
  Media Highlight -
  NY Times : Why the Big Bang produced something rather than nothing
  BBC : Biggest cosmic mystery 'step closer' to solution
  El Mundo: Un experimento con neutrinos y antineutrinos para explicar la composicil universo actual

Selected Conferences & Seminars

NuFACT 2022 — Salt Lake City, US
Parallel talk — [August, 2022]

7th Symposium on Neutrinos and Dark Matter in Nuclear Physics — Asheville, US
Invited plenary talk — [May, 2022]

Quarks 2 Cosmos, APS April — New York City, US
Invited plenary talk — [April, 2022]

Interdisciplinary Developments in Neutrino Physics — Santa Barbara, US
Invited plenary talk — [March, 2022]

Rising Star in Experimental Particle Physics Symposium — Chicago, US
Invited talk — [October, 2021]

Institute for Nuclear and Particle Astrophysics Seminar — Berkeley, US
Lawrence Berkeley National Lab — [April, 2021]
Invited seminar

XIX International Workshop on Neutrino Telescopes — Padova, Italy
Parallel talk — [February, 2021]

Professional Service

- Elected Early Career member of the Executive Committee of the NOvA experiment. [March 2022 - Present]
- Served as the co-convener of the NOvA Production team that is tasked to generate and produce all simulated and data files for the experiment. [May 2020 - October 2021]
- Reviewer for Physical Review D and Physical Review Letter Journal. [2020 - Present]
- Served on the Analysis Review Committee for NOvA and DUNE experiments. [2019 - Present]
- First elected representative of T2K-Young to represent graduate students and postdocs and their interests at the collaboration. [2016-2017]

Public Involvement & Outreach

- Mentored undergraduate students as part of Caltech's Freshman Summer Research Institute (program designed to provide academic support to the incoming class of underrepresented students) and WAVE Fellows (program aimed at fostering diversity by increasing the participation of students from historically marginalized identities in STEM). [Summer 2021, 2022]
- Co-developed and taught a month long course on *Science and Society* for an after school program for high-school students of underserved communities in Pasadena, California. [April-May, 2021]
- Featured on the *Story Collider* podcast. [March, 2019]
- Founding member of T2K-Women, a group to enable networking of women within T2K and provide a forum to discuss gender and equity issues. [2017]
- President of Graduate Women in Science and Engineering group at Stony Brook University, leading a team of 10 council members to organize talks, workshops and other events to promote women and other minorities in STEM fields. [2016-2017]
- Student representative of Diversity Committee at Department of Physics and Astronomy, Stony Brook University. [2016-2017]
- Designed and taught a course on *Introduction to Particle Physics* for an honors program for undergraduate women at Stony Brook University. [Spring, 2016]

Awards & Fellowship

- Awarded the University Research Association's Visiting Scholar Program fellowship to work at Fermilab for 6 months. [2022]
- Won the Rising Star in Experimental Particle Physics award and was invited to present my work in the symposium. [2021]
- Awarded the American Association of University Women (AAUW) International Fellowship for academic achievement and commitment towards women and girls. [2017-2018]
- Won the first prize and people's choice award at the university wide 3 Minute Thesis competition for presenting my thesis research to a non-expert audience. [2017]
- Awarded the Institute Silver Medal for outstanding academic achievement in the masters program at Indian Institute of Technology, Bombay. [2012]
- Qualified the National Eligibility Test with a Junior Research Fellowship Award conducted by the University Grants Commission, India. [2012]
- Inaugural recipient of 'Innovation in Science Pursuit for Inspired Research' (INSPIRE) Scholarship by Department of Science and Technology, Govt. of India. [2007-2012]

Skills

Software: Docker, Singularity, Git, CVS, SVN
Coding: C++, ROOT, Python, CUDA, Numba
Hardware: Machine Shop Tools: Lathe, Milling, Drill Press
Languages: Hindi (native), English (fluent)
Science Communication: Trained at Alan Alda Center for Communicating Sciences
Others: Dance, Capoeira, Theatre