Pranava Teja Surukuchi

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Education

2014 - 2019 **Ph.D., Physics**
Illinois Institute of Technology, Chicago, IL, USA
Thesis Title: Search for Sterile Neutrino Oscillations with the Prospect Experiment

2012 - 2013 **M.S., Physics**
Illinois Institute of Technology, Chicago, IL, USA

2006 - 2010 **B.Tech., Mechanical Engineering**
Jawaharlal Nehru Technological University, Hyderabad, India

Appointments

2019 - Present **Postdoctoral Research Associate**
Yale University, Wright Laboratory, New Haven, CT, USA
Advisor: Dr. Karsten Heeger

2014 - 2019 **Research Assistant**
Illinois Institute of Technology, Chicago, IL, USA
Advisor: Dr. Bryce Littlejohn

Research Projects

2019 - Present **Project 8** *(neutrino mass measurement experiment)*
https://www.project8.org
Advisor: Dr. Karsten Heeger

- ***Chair*** of Phase-III antenna array design working group (June 2020 - Present)
- ***Coordinator*** of Phase-III position, track, and event reconstruction group (Oct 2020 - Present)
- ***Early Career Representative*** to the science board (Jan 2020 - Present)
- Developed simulations for antenna array radiation detection and electron reconstruction
- Detector operator for the experiment's Phase II data taking campaigns

2019 - Present **CUORE and CUPID** *(neutrinoless double beta decay experiments)*
https://cuore.lngs.infn.it, https://cupid.lngs.infn.it/
Advisor: Dr. Karsten Heeger

- ***WBS lead*** on acoustic and vibration sensors for the CUPID experiment
- Lead on the design of the muon veto system for the CUORE/CUPID experiment
- Performed efficiency calculations in search for neutrinoless double beta decay on the CUORE experiment
- CUORE Vetting Board member (Nov 2019 - Nov 2021)
- Shifter calendar administrator (2019 - Present)

2014 - Present **PROSPECT** *(Precision Reactor Oscillation and Spectrum Experiment)*
https://prospect.yale.edu
Advisors: Dr. Bryce Littlejohn and Dr. Karsten Heeger

- ***Convener*** of oscillation working group (2017-2019)
- ***Lead*** of design, fabrication, QA, and assembly of the target segmentation system
- ***Developer*** of PROSPECT's official sterile neutrino search framework
- Performed PROSPECT's first oscillation search for eV-scale sterile neutrinos
- Member of PROSPECT analysis coordination group (2017-2019)

Awards and Recognition

2017 **2017 APS April meeting Travel Grant**
Awarded to support travel to APS April meeting to present research work

2016, 2015 **IIT Annual BCPS poster presentation award**
First(2016), second(2015) prize for presenting research poster at the Annual Biology, Chemistry and Physics poster session

2015 **Faculty nominated member to Sigma Pi Sigma**

Synergistic Activities and Service

- Snowmass 2021 Neutrino Oscillations (NF02) - White Paper Editor
- Snowmass 2021 Neutrino Properties (NF05) - Liaison
- Nuclear Particle and Astrophysics Seminar Series - Organizer (2020–2021)
- Snowmass 2021 Early Career Long-Term Organization - Team Leader (2020)
- APS DNP Conference Experience for Undergraduates 2020 - Chair
- APS DNP Conference Experience for Undergraduates 2020 - Mentor
- APS DNP Conference Experience for Undergraduates 2019 - Mentor
- Chicago Area STEM Exhibition 2018 - Judge
- Chicago Area Undergraduate Research Symposium 2017 - Judge
- CSIM, IV International Military Games - Volunteer (2007)

Outreach

- Yale Physics Olympics 2019 - Executive Member
- Academy of Urban School Leadership 7^{th} annual STEAM fair 2018 - Judge
- International Conference on High Energy Physics 2016 - Outreach Volunteer
- Math Club, Illinois Institute of Technology - Vice-President (2012-2013)
- IIT High School Math Competition - Executive Member (2013, 2012)
- Skyway Enrichment Program - Program Developer (2012)

Teaching and Mentoring

2021	**PHYS 530/BBS 879: Theory and Practice of Scientific Teaching** Poorvu Center for Teaching and Learning, Yale University, New Haven, CT, USA
2021	**Mentorship Training Program for Postdocs** Yale Postdoctoral Affairs, Yale University, New Haven, CT, USA
2014	**Teaching Assistant** Department of Physics, Illinois Institute of Technology, Chicago, IL, USA
2013 - 2016	**Graduate Scholar (Tutor)** Academic Resource Center, Illinois Institute of Technology, Chicago, IL, USA
2012	**Program Instructor** Chicago Public Schools, Chicago, IL, USA

Students Mentored

Samantha Pagan	2019 - Present	Graduate student at Yale University *Prototyping, design, and data analysis for CUPID muon veto system*
Ridge Liu	2020 - Present	Graduate student at Yale University *Correlation analysis between CUORE detectors and auxiliary devices* *Efficiency analysis for CUORE's search for $0\nu\beta\beta$*
Iris Ponce	2020 - Present	Graduate student at Yale University *DAQ design for CUPID muon veto system*
Caitlin Gainey	2019 - 2021	Undergraduate student at Yale University *Development of Geant4 simulations for CUPID muon veto system*
Gabe Hoshino	2020 - 2021	Now at University of Chicago *Development of Geant4 simulations for CUPID muon veto system*
Yonas Gebre	2016 - 2018	Now at University of Colorado, Boulder *Reactor antineutrino phenomenology*

Invited Seminars and Talks

[9] **Direct Measurement of Neutrino Mass with Project 8 Experiment**
Fundamental Physics Directorate seminars, SLAC National Accelerator Laboratory, Remote seminar, Nov 30, 2021

[8] **Latest Results from the CUORE Experiment**
Nuclear, Particle, and Astrophysics Seminar, Wright Laboratory, Yale University, Remote seminar, May 19, 2021

[7] **Direct Measurement of Neutrino Mass with the Project 8 Experiment**
Kavli Institute for Cosmological Physics Seminar Series, University of Chicago, Remote seminar, Feb 25, 2021

[6] **CUORE, CUPID, and the Nature of Neutrino Mass**
Brookhaven National Laboratory Seminar, June 18, 2020

[5] **First search for short-baseline neutrino oscillations at HFIR with PROSPECT**
Fermilab Joint Experimental-Theoretical Physics Seminar, Fermilab, Batavia, IL, USA, Aug, 2018

[4] **Prospects for Sterile Neutrino Searches at Reactors (Invited)**
Nu Horizons VII, Harish Chandra Research Institute, Allahabad, India, Feb 22, 2018

[3] **PROSPECT: A Precision Reactor Oscillation and Spectrum Experiment**
Indian Institute of Technology, Hyderabad, India, Feb 19, 2016

[2] **Latest Status on the Search for Sterile Neutrinos**
40^{th} International Symposium on Physics in Collision (PIC 2020), Aachen, Germany, September 14 – 17, 2021

[1] **Latest Results from the CUORE Experiment**
20^{th} Lomonosov Conference on Elementary Particle Physics, Remote, Aug 19 – 25, 2021

Conferences and Presentations

[16] **Latest Results from the CUORE Experiment in Search for $0\nu\beta\beta$**
APS DNP Conference, Remote, Oct 12, 2021

[15] **Event Reconstruction in the Project 8 Free Space CRES Demonstrator**
APS April Meeting, remote conference, Apr 19, 2021

[14] **Analysis Techniques for Background Reduction and Event Identification in the Search for $0\nu\beta\beta$ with CUORE**
APS DNP Conference, Remote, Oct 30, 2020

[13] **Simulation and Signal Extraction for the Project 8 Free Space CRES Demonstrator**
XXIX International Conference on Neutrino Physics and Astrophysics, Remote, June 22 – 2, 2020

[12] **Modeling Transmitting Antennas to Simulate Phase-III of the Project 8 Experiment**
APS DNP Conference, Arlington, Virginia, USA , Oct 16, 2019

[11] **Measurement of Reactor Antineutrino Spectrum from ^{235}U using PROSPECT**
APS DPF Conference, Northeastern University, Boston, MA, USA, Aug 8, 2019

[10] **Searching for Sterile Neutrino Oscillations with the PROSPECT Experiment (Poster)**
51st Annual Users Meeting, Fermilab, Batavia, IL, USA, Jun 20, 2018

[9] **Prospects for Improved Understanding of Isotopic Reactor Antineutrino Fluxes**
5th Annual PIKIO Conference, University of Illinois Urbana-Champaign, Urbana, IL, USA, Mar 17, 2018

[8] **Design of the PROSPECT Experiment (Poster)**
International Neutrino Summer School, Chicago, IL, USA, Aug 16, 2017

[7] **PROSPECT: Precision Reactor Oscillation and Spectrum Experiment**
APS DPF Conference, Fermilab, Chicago, IL, USA, Aug 8, 2017

[6] Sterile Neutrino Search with the PROSPECT Experiment
New Perspectives Conference, Fermilab, Chicago, IL, USA, Jun 6, 2017

[5] A Precision Reactor Oscillation and Spectrum Experiment
IPA 2017, Chicago, IL, USA, May 9, 2017

[4] Sterile Neutrino Search with the PROSPECT Experiment
APS April Meeting, Washington DC, USA, Jan 28, 2017

[3] Design of the PROSPECT Experiment (Poster)
International Conference on High Energy Physics, Chicago, IL, USA, Aug 6, 2016

[2] Background and Detector Response Studies for PROSPECT Experiment
Prairie Section American Physical Society Meeting (PSAPS), Notre Dame University, South Bend, IN, USA, Nov 21, 2015

[1] PROSPECT: A Precision Reactor Oscillation and Spectrum Experiment
New Perspectives Conference, Fermilab, Chicago, IL, USA, Jun 8, 2015

Significant Refereed Publications

(Publications where I made significant contributions)

[10] High sensitivity neutrinoless double-beta decay search with one tonne-year of CUORE data
CUORE Collaboration, arXiv:2104.06906 ***(Currently under peer review)***
Contribution: Mentored a team of students to perform efficiency analysis crucial for $0\nu\beta\beta$ search

[9] CUORE Opens the Door to Tonne-scale Cryogenics Experiments
CUORE Collaboration, PPNP (2021) 103902
Contribution: Primary co-author and coordinator of the manuscript

[8] Improved Limit on Neutrinoless Double-Beta Decay in 130Te with CUORE
CUORE Collaboration, Phys. Rev. Letter. 124, 122501 (2020)
Contribution: Performed efficiency analysis crucial for $0\nu\beta\beta$ search

[7] Diagnosing the Reactor Antineutrino Anomaly with Global Antineutrino Flux Data
C. Giunti , Y.F. Li, B.R. Littlejohn, P.T. Surukuchi, Phys. Rev. D 99, 073005 (2019)
Contribution: Analysed and interpreted global neutrino data

[6] Measurement of the Antineutrino Spectrum from ^{235}U Fission at HFIR with PROSPECT
PROSPECT Collaboration, Phys. Rev. Lett. 122, 251801 (2019)
Contribution: Performed cross-checks and interpreted results

[5] A Low Mass Optical Grid for the PROSPECT Reactor Antineutrino Detector
PROSPECT Collaboration, JINST 14, P04014 (2019)
Contribution: Instrumentation lead and primary co-author of the paper

[4] The PROSPECT Reactor Antineutrino Experiment
PROSPECT Collaboration,Nuclear Inst. and Methods in Physics Research, A (2018), Pages 287-309
Contribution: Performed simulation and contributed to writing of manuscript

[3] First search for short-baseline neutrino oscillations at HFIR with PROSPECT
PROSPECT Collaboration, Phys. Rev. Lett. 121 251802 (2018)
Contribution: Coordinated and performed primary analysis

[2] Prospects for improved understanding of isotopic reactor antineutrino fluxes
Y.Gebre, B. R. Littlejohn, P. T. Surukuchi, Phys. Rev. D 97, 013003 (2017)
Contribution: Primary analyzer and corresponding author

[1] The PROSPECT Physics Program
PROSPECT Collaboration, J. Phys. G: Nucl. Part. Phys. 43 113001 (2016)
Contribution: Performed simulation and contributed to writing of manuscript

Other Refereed Publications

[17] PROSPECT-II Physics Opportunities
PROSPECT Collaboration, arXiv:2107.03934 ***(Accepted by PRL, undergoing proof edits)***

[16] Joint Measurement of the ^{235}U Antineutrino Spectrum by PROSPECT and STEREO
PROSPECT and STEREO Collaborations, arXiv:2107.03371 ***(Currently under peer review)***

[15] Joint Determination of Reactor Antineutrino Spectra from ^{235}U and ^{239}Pu Fission by Daya Bay and PROSPECT
Daya Bay and PROSPECT Collaborations, arXiv:2106.12251 (Currently under peer review)

[14] Bayesian Analysis of a Future Beta Decay Experiment's Sensitivity to Neutrino Mass Scale and Ordering
Project 8 Collaboratiion, Phys.Rev.C 103 (2021) 6, 065501

[13] Measurement of the $2\nu\beta\beta$ Decay Half-Life of ^{130}Te with CUORE
CUORE Collaboration, Phys.Rev.Lett. 126 (2021) 17, 171801

[12] Search for Double-Beta Decay of ^{130}Te to the 0^+ States of ^{130}Xe with CUORE
CUORE Collaboration, Eur.Phys.J.C volume 81 (2021) 567

[11] Characterization of cubic $Li_2^{100}MoO_4$ crystals for the CUPID experiment
CUPID Collaboration, Eur.Phys.J.C 81 (2021) 2, 104

[10] A CUPID $Li_2^{100}MoO_4$ scintillating bolometer tested in the CROSS underground facility
CUPID Collaboration, JINST 16, P02037 (2021)

[9] A novel technique for the study of pile-up events in cryogenic bolometers
CUPID Collaboration, Phys. Rev. C 104, 015501 (2021)

[8] Limits on Sub-GeV Dark Matter from the PROSPECT Reactor Antineutrino Experiment
PROSPECT Collaboration, Phys.Rev.D 104 (2021) 1, 012009

[7] Improved Short-Baseline Neutrino Oscillation Search and Energy Spectrum Measurement with the PROSPECT Experiment at HFIR
PROSPECT Collaboration, Phys. Rev. D 103, 032001 (2021)

[6] Nonfuel antineutrino contributions in the ORNL High Flux Isotope Reactor
PROSPECT Collaboration, Phys.Rev.C 101 (2020)

[5] The Radioactive Source Calibration System of the PROSPECT Reactor Antineutrino Detector
PROSPECT Collaboration, Nuclear Inst. and Methods in Physics Research, A (2019), 162465

[4] Lithium-loaded Liquid Scintillator Production for the PROSPECT experiment
PROSPECT Collaboration, JINST 14, P03026 (2019)

[3] Performance of a segmented ^{6}Li-loaded liquid scintillator detector for the PROSPECT experiment
PROSPECT Collaboration, arXiv:1805.09245, JINST 13, P06023 (2018)

[2] Background radiation measurements at high power research reactors
PROSPECT Collaboration, Nuclear Inst. and Methods in Physics Research, A (2016), pp. 401-419

[1] Light collection and pulse-shape discrimination in elongated scintillator cells for the PROSPECT reactor antineutrino experiment
PROSPECT Collaboration, JINST 10, P11004 (2015)

Proposals, Reports, and Preprints

[3] Note on arXiv:2005.05301, 'Preparation of the Neutrino-4 experiment on search for sterile neutrino and the obtained results of measurements'
PROSPECT Collaboration and STEREO Collaboration, arXiv:2006.13147

[2] CUPID pre-CDR
CUPID Collaboration, arXiv:1907.09376

[1] PROSPECT - A Precision Reactor Oscillation and Spectrum Experiment at Short Baselines
PROSPECT Collaboration, arXiv:1309.7647

Technical Skills

Programming Languages	C, C++, ROOT, Bash, Java, LaTeX Mathematica, Python, mySQL, PostgreSQL, Geant4
Platforms	Linux, Mac OSX, Microsoft Windows
Tools and Technologies	AutoCAD Inventor, Microsoft Office, Additive manufacturing techniques

Other Work Experience

2012 - 2015	**IT Manager** TechNews, student-run newspaper at Illinois Institute of Technology, Chicago, IL, USA
2012 - 2014	**Help Desk Assistant** Office of Technical Services, Illinois Institute of Technology, Chicago, IL, USA
2010 - 2011	**Assistant Systems Engineer** Tata Consultancy Services, Mumbai, India

Languages

English	Full professional proficiency
Hindi	Native proficiency
Telugu	Native proficiency

References available upon request