# Anjali Nambrath

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## Education

**Massachusetts Institute of Technology**                                        June 2021

S.B. in Physics & Mathematics with minor in French, Phi Beta Kappa. GPA: 4.9/5.0

*Selected coursework*: Quantum Information Science, Quantum Mechanics III, Stochastic Processes, Algebra, Electromagnetism II, Nonlinear Dynamics: Chaos, Signals and Systems, Machine Learning

## Research experience

**MIT Center for Theoretical Physics** Undergrad researcher                Jan. 2020 - present

· Working with Dr. Katelin Schutz to understand axion gegenschein in the dark matter halo

· Identifying potential astrophysical sources of radio waves for a gegenschein survey

**Hen Lab – MIT Hadronic Physics Group** Undergrad researcher                Nov. 2017 - present

· Analyze electron-deuterium scattering data from CLAS to test energy reconstruction methods

· Compared neutrino energy reconstruction methods for the Deep Underground Neutrino Experiment (DUNE)

· Calculated scintillator and photomultiplier efficiency for the Backward Angle Neutron Detector (BAND)

· Developed a laser-based calibration system to ensure measurement stability for BAND

**Fermi National Accelerator Laboratory** SULI research intern                June 2019 - Aug. 2019

· Simulated experimental data for DUNE using the GENIE Monte Carlo event generator

· Explored and verified the efficacy of reconstruction smearing matrices with electron data from CLAS

**Winslow Group – MIT Neutrino & Dark Matter Group** Undergrad researcher    Jan. 2019 - May 2019

· Modeled behavior of magnetic shielding material for the ABRACADABRA axion detector

· Maintained and machined components for the ABRACADABRA dilution refrigerator

**Thomas Jefferson National Accelerator Facility** Undergrad researcher        June 2018 - Aug. 2018

· Constructed scintillator bar and photomultiplier modules for BAND

· Assembled and installed BAND and its electronics in Jefferson Lab Hall B

## Teaching

**MIT Educational Studies Program** Teacher (Spark, Splash, HSSP)                2018 - 2021

· 6 one-hour sessions on relativity and black holes ("Black Holes!") for over 150 students

· 3 one-hour sessions on the Standard Model ("The Standard Model!") for 50 students

· 3-week course on modern physics ("Physics of the Extreme!") for 40 students

· 6-week course on quantum computing ("Quantum Computing!") for 40 students

· 6-week course on the history of science ("History of 20th Century Science") for 30 students

**MIT Physics Department** Teaching assistant                                        Jan. 2021

Teaching assistant for Computational Data Science in Physics, taught by Prof. Philip Harris. Taught and developed material for recitations twice a week and provided support on weekly data science projects.

**MIT Mathematics Department** Undergraduate teaching assistant                    Fall 2020

Teaching assistant for Quantum Computing, taught by Prof. Peter Shor. Assembled lecture notes, moderated online lectures, conducted weekly office hours, and graded weekly problem sets.

**MIT Physics Department** Grader and tutor                                       2018 - 2020

Graded weekly problem sets for one semester of Physics III, one semester of Statistical Mechanics, one semester of Relativity, and one semester of Quantum Physics I. Tutored Physics III student for one semester.

## Selected awards

MIT Physics Malcolm Cotton Brown Award (excellence in experimental physics) .............. June 2021

MIT Physics Order of the Lepton Award .................................................... June 2021

MIT Global Languages Awards for Excellence, First Prize .................................... May 2021

Laya W. Wiesner Award (Institute Award for contributions to MIT community life) ............ May 2021

Finalist for Fulbright India Student Research award ......................................... 2021-22

National Science Foundation Graduate Research Fellowship ...................................2021-26

Berkeley Fellowship for incoming graduate students at UC Berkeley ............................2021-23

January Scholars in France for excellence in French Studies ...................................Jan. 2020

Burchard Scholar for excellence in the humanities at MIT ....................................... 2019

APS Division of Nuclear Physics CEU Fellowship .......................................... Oct. 2018

## Publications

**Electron Beam Energy Reconstruction for Neutrino Oscillation Measurements** submitted to *Nature*
M. Khachatryan, A. Papadopoulou, A. Ashkenazi, F. Hauenstein, **A. Nambrath**, et al.

**Laser Calibration System for Time of Flight Scintillator Arrays**   Nucl. Inst. Methods A 973 (2020)
A. Denniston et al.

**The CLAS12 Backward Angle Neutron Detector (BAND)**   Nucl. Inst. Methods A 978 (2020)
E.P. Segarra et al.

## Presentations and posters

**IAIFI Internal Seminar (invited)**                                              February 2021
Open Data Science in Physics Courses (with P. Harris, K. Morey, M. Szurek, J. Chongsathapornpong)

**APS Divison of Nuclear Physics yearly meeting**                                October 2020
Benchmarking neutrino energy reconstruction with electron-deuterium scattering (abstract)

**MIT PRISM (departmental undergraduate conference)**                            August 2020
Benchmarking neutrino energy reconstruction with electron-deuterium scattering

**MIT Family Weekend Physics Open House (invited)**                              October 2018
Neutrons, Nuclei, and Neutrinos: BAND and Electrons for Neutrinos

**Fermilab and Argonne National Lab summer undergraduate poster session**        August 2019
Studying the use of e- data for DUNE energy reconstruction (poster)

**APS Divison of Nuclear Physics yearly meeting**                                October 2018
Testing and constructing BAND, a backward angle neutron detector (poster)

## Community involvement

Member of MIT OpenCourseWare Advisory Committee ...........................Fall 2020 - Spring 2021

Member of MIT Physics Dept.'s Values Committee ...........................Spring 2020 - Spring 2021

MIT Associate Advisor to four first-years .....................................Fall 2020 - Spring 2021

Counselor for MIT Physics Pre-Orientation Program ..........................................Fall 2020

Board member of MIT Undergraduate Womxn in Physics .....................Spring 2019 - Spring 2021

President and Outreach Chair of MIT Society of Physics Students .............Spring 2018 - Spring 2021

Editor of MIT Undergraduate Research Journal ................................Fall 2017 - Spring 2019

## Languages

· **Programming/markup:** LaTeX, Python, C++/ROOT, numpy/PyTorch

· **Written/spoken:** English (fluent), French (advanced), Malayalam (advanced)