

RAZU MOHIUDDIN

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As an aspiring physicist, my passion for exploring the mysteries of the universe has led me to pursue a career at NASA. I am eager to contribute to the agency's groundbreaking research and discoveries in space science.

EDUCATION

University of Dhaka, Dhaka 1000 Bangladesh
B.S. Honors in Physics 2018

Case Western Reserve University, Cleveland, OH 44106 USA
Doctor of Philosophy Candidate (Physics) 2021

Graduate Courses: Classical Mechanics, Quantum Mechanics I & II, Non-Equilibrium Statistical Mechanics, Classical Electrodynamics, Cosmology, NMR Imaging, *Standard Model, Advanced Nuclear Physics and Technology, Independent Research Courses.*

RESEARCH EXPERIENCE

Community of Physics, Dhaka 1205
GR and Electromagnetism Research Groups January 2018 – June 2020

Worked in collaboration with Gravitational Wave International Committee (GWIC) on third generation gravitational-wave detector development.

EM Project: “*Homogeneous Magnetic Field in a Symmetric (2N+1) Circular Coil System*”. Our objective was to analytically find optimized parameters for producing arbitrarily homogeneous magnetic field on the z-axis of a symmetric (2N+1) coil system.

Project 8 Collaboration
Direct Neutrino Mass Measurement Using CRES January 2020 – Present

Working on resonant cavity and trap design for studying individual electrons going under cyclotron motion.

Developing machine learning algorithms for triggering DAQ system and for track & event reconstructions.

Working groups: Frequency selection, machine learning, cavity electron-gun, antenna, simulation

PUBLICATIONS

“*Bayesian Analysis of a Future Beta Decay Experiment's Sensitivity to Neutrino Mass Scale and Ordering*” — Physical Review C [DOI: [10.1103/PhysRevC.103.065501](https://doi.org/10.1103/PhysRevC.103.065501)]

“*The Project 8 Neutrino Mass Experiment*” — Snowmass 2021 [DOI: [10.48550/arXiv.2203.07349](https://doi.org/10.48550/arXiv.2203.07349)]

“*SYNCA: A Synthetic Cyclotron Antenna for the Project 8 Collaboration*” — Journal of Instrumentation [DOI: [10.1088/1748-0221/18/01/P01034](https://doi.org/10.1088/1748-0221/18/01/P01034)]

“*Viterbi Decoding of CRES Signals in Project 8*” — New Journal of Physics [DOI: [10.1088/1367-2630/ac66f6](https://doi.org/10.1088/1367-2630/ac66f6)]

TEACHING EXPERIENCE

Case Western Reserve University, Cleveland, OH

Laboratory Supervisor — Physics

Spring 2022

Taking care of undergraduate laboratory sessions, managing Graduate Teaching Assistants and Undergraduate Helpers in order to run the sessions smoothly. Taking impromptu actions to solve unexpected scientific and logistic problems.

Graduate Teaching Assistant — “General Physics I (PHYS 121)”

Fall 2019, Spring 2020

Teaching undergraduate physics laboratory, designing quizzes, grading papers and worksheets. Grading theory course examinations. Giving students continuous feedback on their progress.

Community of Physics, Dhaka 1205

Course Instructor — “Classical Mechanics (CM01/2019)”

July 2018 – June 2019

Developed syllabus and course structure for this graduate level course. Preparing test questions and evaluating answer scripts. Distributing tasks to TA and LA’s for developing an effective learning environment.

Community of Physics, Dhaka 1205

Course Instructor — “Management & Professional Development”

January 2018 – June 2019

Developed syllabus and course structure. Taught usage and application of different office and scientific software packages.

RELATED EXPERIENCE

Case Western Reserve University, Cleveland, OH 44106

Department Representative — Graduate Council of Arts & Sciences

August 2021 – Present

Representing the physics department graduate students at the College of Arts & Sciences council

Case Western Reserve University, Cleveland, OH 44106

Member — APS-IDEA, AIP TEAM-UP

June 2020 – Present

Working with other US institutions in effort to address equity, diversity, and inclusion (EDI) challenges in physics

Case Western Reserve University, Cleveland, OH 44106

Judge — CWRU Undergraduate Research Society

Spring 2022

Judged research ideas on fighting climate change from various undergraduate research groups

Community of Physics, Dhaka 1205

Director of Academics

February 2014 – June 2020

Managed on-site and online courses, helped with course structure and instructor-student relations while ensuring high standards of curriculum. Also worked at different positions throughout the membership period

Bangladesh Physics Olympiad Committee, Dhaka 1209

Academic Member

September 2014 – May 2019

Set, moderated question papers and evaluated answer scripts for Bangladesh Physics Olympiad. Providing support on maintain the quality of test questions and selecting talented participants from across the country

OUTREACH ACTIVITIES

Center for Education and Research in Cosmology and Astrophysics (CERCA) seminar

Speaker — “How to use National Ignition Facility to investigate the deep interiors of red dwarf stars”

January 2023

Seminar talk on using the NIF to create and study the core of a M dwarf star.

Audience: Particle and Astrophysicists in the physics and astronomy departments.

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- American Physical Society – Division of Nuclear Physics Conference, New Orleans, LA 70113
Speaker — “Deep Learning Based CRES Track and Event Reconstruction in Project 8” **October 2022**
Contributed talk on utilizing deep learning technique for spectrogram analysis to overcome classical limitation in Project 8
Audience: Physicists from all over the globe
- Center for Education and Research in Cosmology and Astrophysics (CERCA) seminar
Speaker — “On Matched and Deep Filtering” **October 2022**
Seminar talk on matched filtering and deep neural network based alternative for low power signal detection.
Audience: Particle and Astrophysicists in the physics and astronomy departments.
- Community of Physics, Dhaka 1205
Speaker — “3rd Workshop on Differential Equations: A Gateway to Physics” **October 2019**
Lectured for one online session, set and moderated question paper. Audience: STEM undergraduates
- Community of Physics, Dhaka 1205
Speaker — “2nd Workshop on Classical Mechanics: Through the Eyes of Giants” **October 2018**
Lectured for two sessions, set and moderated question paper. Audience: STEM undergraduates
- Community of Physics, Dhaka 1205
Speaker — “2nd Workshop on Relativity: A Tale of Spacetime” **February 2018**
Lectured for two sessions, set and moderated question paper. Audience: STEM undergraduates
- Community of Physics, Dhaka 1205
Speaker — “2nd Workshop on Vector Calculus: A Story of Curved Space” **September 2017**
Lectured for a session and set question paper. Audience: STEM undergraduates

SKILLS

- Advanced programing expertise in Python and C++
Programs: COMSOL Multiphysics: AC/DC and Optics modules
Ansys HFSS
In-house analysis software:
Locust – designed to simulate and readout electron behavior in electromagnetic field
Katydid – for interfacing with locust to supply custom geometry and their effects/response

MEMBERSHIPS

- American Physical Society (APS) – Division of Nuclear Physics (DNP)
Snowmass Early Career Scientists (SEC)