Rebecca Rapp

PhD Candidate, Carnegie Mellon University, Pittsburgh, PA, 15213
Website: rapprl.github.io **ORCID:** 0000-0003-4590-687X
Email: rrapp@andrew.cmu.edu **Phone:** 724-809-1951

Education

M.S. / Ph.D. in Physics (May 2019 / Anticipated 2022)
Carnegie Mellon University, Pittsburgh, PA 15213

- Field: Experimental nuclear/particle physics, neutrino physics
- Thesis (*in progress*): Characterizing neutrino and neutron fluxes at the Spallation Neutron Source
- Thesis Committee: Diana Parno (advisor), Curtis Meyer, Riccardo Penco, Brian Quinn
- Honors: Hugh Young Graduate Student Teaching Award, J. Michael McQuade Graduate Research Fellowship

B.A., Physics & Mathematics (May 2017)
Washington & Jefferson College, Washington, PA 15301

- Advisors: Michael McCracken (Physics), Faun Doherty (Math)
- Honors: *Summa Cum Laude*, ΦBK, George Winchester Prize (Physics), Clyde Shepherd Atchison Prize (Math)

Graduate Research Activities

- Studying CEvNS at the Spallation Neutron Source (SNS) as a member of COHERENT (August 2017 - present)
  - Maintainer for a Geant4 simulation predicting the neutrino production at the SNS
    - Advising Samuel Vasquez (CMU '22): $\bar{\nu}_e$ production from target activation (May 2021 - present)
    - Advising Aria Salyapongse (CMU '21): validations against π-production data (May 2020 - present)
    - Advised Shuaixiang Zhang (USTC '20): modeling the SNS Second Target Station (Summer 2019)
  - Ongoing work with the MARS neutron monitoring subsystem (simulation and data analysis)
    - Advised Duy Hoang (CMU '22): simulating a detailed Cf252 fission source (May 2020 - May 2021)
  - Contributing to design and commissioning studies for a D_2O detector to normalize neutrino flux
    - Advising Alex Arteaga (CMU '23): constructing a Michel electron analysis (May 2021 - present)
- Worked with Brian Quinn to customize photomultiplier tubes for parity-violation experiments and achieved nonlinearity on the order of 0.2% under CRex operating conditions (August - December 2018)

Grants Awarded

- DOE Office of Science Graduate Student Research Award (Solicitation Cycle 2021-1; January - July 2021)
  - Project title: Investigating neutrino and neutron fluxes at the Spallation Neutron Source
  - Collaborating DOE Scientist: Jason Newby, Oak Ridge National Laboratory

Teaching Experience

- Teaching Assistant for 33-142: Physics II for Engineering and Physics Students — August - December 2020
  Department of Physics, Carnegie Mellon University — Supervisor: Hael Collins
  Led lecture-style recitations, graded student work, devised example problems, and ran virtual course centers
- Geant4 / ROOT Boot Camp for the Parno Group at Carnegie Mellon University — Summer 2020
  Led multiple workshops teaching new group members to use C++, Geant4, ROOT, and computing clusters
- Teaching Assistant for 33-121: Physics I for Science Students — August 2017 - May 2019
  Department of Physics, Carnegie Mellon University — Supervisors: Stephen Garoff, Manfred Paulini
  Led group-work recitations and python exercises, graded student work, and ran course centers

Technical Skills

- Programming:
  - Developer: python, Mathematica, C++, Geant4, ROOT
  - User: Grafana, sqlite, coda, Arduino, LabVIEW, MATLAB
  - Techniques: large-scale data analysis, data visualization and fitting, Monte Carlo simulation, basic instrument interfacing, data acquisition
- Electronics: basic circuit construction, photomultiplier tube alterations, high voltage, data acquisition
- Other: basic glassblowing, basic machine shop experience

Professional Service and Leadership

- Student member of the Physics Graduate Program Committee at Carnegie Mellon (August 2021 - present)
- Graduate student member of COHERENT's Diversity and Inclusion Committee (July 2020 - present)
- Serving as Data Coordinator for the COHERENT collaboration (June 2020 - present)
- Junior Member Representative to the COHERENT Collaboration Board (January 2020 - January 2021)
- Panelist for discussion on Applying to Graduate School, CMU Society of Physics Students (2019, 2020, 2021)
- Panelist for virtual discussion on Graduate School Climates at Georgetown University (10 September 2020)
- American Physical Society's Conferences for Undergraduate Women in Physics
  - Contributed to the national application review and chaired student talk session at virtual CUWiP 2021
  - Served in leadership roles during the organization of PghCUWiP in 2020
    - Coordinated with faculty to draft initial proposal to APS to host a CUWiP site in Pittsburgh
    - Member of the national organizing committee, chaired local admissions and logistics committees
    - Led coordination of volunteers, served as primary point of contact for all participants
    - Panelist for *Work/Life Balance: Personal Interests*, chaired student research talk session
  - Assisted with networking events as a graduate student in 2019 (TCNJ) and 2021 (virtual)
  - Attended as an undergraduate in 2016 (ODU/JLab) and 2017 (Princeton)

Publications

- A D_2O detector for flux normalization of a pion decay-at-rest neutrino source
  COHERENT collaboration **(Working group contributor)**, JINST **16**, P08048 – 16 August 2021.
- First Detection of Coherent Elastic Neutrino-Nucleus Scattering on Argon
  COHERENT collaboration, Phys. Rev. Lett. **126**, 012002 – 7 January 2021.
- Sensitivity of the COHERENT Experiment to Accelerator-Produced Dark Matter
  COHERENT collaboration, Phys. Rev. D. **102**. 052007 – 29 September 2020.

Preprints / Papers In Submission

- First Probe of Sub-GeV Dark Matter Beyond the Cosmological Expectation with the COHERENT CsI Detector at the SNS, COHERENT collaboration, arXiv:2110.11453 [hep-ex] (to be submitted to Science)
- Measurement of scintillation response of CsI[Na] to low-energy nuclear recoils by COHERENT
  COHERENT collaboration, arXiv:2111.02477 [physics.ins-det] (to be submitted to PRL)
- Measurement of the Coherent Elastic Neutrino-Nucleus Scattering Cross Section on CsI by COHERENT
  COHERENT collaboration, arXiv:2110.07730 [hep-ex] (to be submitted to PRL)
- Simulating the neutrino flux from the Spallation Neutron Source for the COHERENT experiment
  COHERENT collaboration **(Corresponding author)**, arXiv:2109.11049 [hep-ex] (to be submitted to PRD)
- Monitoring the SNS basement neutron background with the MARS detector
  COHERENT collaboration **(Working group contributor)** (responding to reviewers at JINST)
- COHERENT 2018 at the Spallation Neutron Source
  COHERENT collaboration, 2018 white paper. arXiv:1803.09183v2 [physics.ins-det]

Recent Presentations

- Invited: Phenomenal cosmic insights – itty bitty recoils: CEvNS and the COHERENT Experiment
  Physics Capstone Discussion, Washington & Jefferson College, Washington, PA (30 September 2021)
- Invited: Phenomenal cosmic insights – itty bitty recoils: CEvNS and the COHERENT Experiment
  Particle/Astrophysics Seminar, Case Western Reserve University, Cleveland, OH (28 September 2021)
- Invited: Impact of a NA61/SHINE Low-E Beamline on the COHERENT expriment
  NA61/SHINE at Low Energy, virtual (9 December 2020)
- Contributed: ORNL Neutrino Flux Simulations: FTS and STS
  Magnificent CEvNS Workshop 2020, virtual (17 November 2020)
- Contributed: Investigating the background neutron flux for COHERENT with MARS
  American Physical Society Division of Nuclear Physics Annual Meeting, virtual (1 November 2020)
- Poster: Studying neutron backgrounds for COHERENT with MARS
  XXIX International Conference on Neutrino Physics and Astrophysics (Neutrino 2020), virtual (22 June 2020)
- Invited: ORNL Neutrino Flux Simulations: FTS and STS
  Magnificent CEvNS Workshop 2019, Chapel Hill, NC (11 November 2019)
- Contributed: COHERENT Plans for D_2O at the Spallation Neutron Source
  American Physical Society Division of Particles & Fields Meeting, Boston, MA (1 August 2019)
- Invited: Spallation Neutron Source Neutrino Flux
  Workshop on Fundamental Physics at the Second Target Station, Oak Ridge, TN (27 July 2019)
- Contributed: Pion production at the Spallation Neutron Source
  The 15^{th} International Conference on Meson-Nucleon Interactions and the Structure of the Nucleon (MENU), Pittsburgh, PA (4 June 2019)
- Contributed: Geant4 Neutrino Flux Simulations of the Spallation Neutron Source
  COHERENT analysis workshop, Indiana University, Bloomington, IN (9 May 2019)
- Poster: Neutrino Flux Simulations at the ORNL Spallation Neutron Source
  XXVIII International Conference on Neutrino Physics and Astrophysics (Neutrino 2018), Heidelberg, Germany (6 June 2018)

Conference Proceedings

- COHERENT Plans for D_2O at the Spallation Neutron Source
  American Physical Society Division of Particles & Fields Meeting 2019. arXiv: 1910.00630 [physics.ins-det]

References

Prof. Diana Parno
Graduate Advisor
Department of Physics
Carnegie Mellon University
dparno@cmu.edu

Prof. Michael McCracken
Undergraduate Advisor
Assoc. Dean for Academic Affairs, Faculty Support
Washington & Jefferson College
mmccracken@washjeff.edu

Dr. Belkis Cabrera-Palmer
MARS Coordinator for COHERENT
Radiation and Nuclear Detection
Sandia National Laboratories (Livermore)
bcabrer@sandia.gov

Dr. Jason Newby
DOE SCGSR Collaborating Scientist
Radiation Detection and Imaging
Oak Ridge National Laboratory
newbyrj@ornl.gov

Aria Salyapongse
Former Student / Research Mentee
Fulbright Scholar (in Thailand 2021-2022)
Parno group, Carnegie Mellon University
asalyapo@andrew.cmu.edu

Prof. Stephen Garoff
TA Course Instructor
Department of Physics
Carnegie Mellon University
sg2e@cmu.edu