Hannah Nemeth

Junior Applied Physics Student at Rensselaer Polytechnic Institute

nemeth@rpi.edu 248-342-8888 Commerce Twp., MI 48382

Education

Aug 2020 – May 2024 | **Rensselaer Polytechnic Institute – Troy NY**
Bachelor of Science in Applied Physics

Aug 2019 – May 2020 | **The American School in Japan – Tokyo JP**
High School Diploma

Sep 2016 – Jun 2019 | **Stoney Creek High School – Rochester MI**

Relevant Coursework

Experimental Physics, Electromagnetic Theory, Thermodynamics and Statistical Mechanics, Intro to Philosophy of Religion, Computing for Physicists, Linear Algebra, Quantum Physics 1 & 2, Computer Science 1, Advanced Calculus, Multivariable Calculus, Differential Equations, Intro to Logic, Physics Meets Social Science, ACT! (Art, Community and Technology)

Research and Lab Experience

Aug 2022 - Ongoing | **Materials Intelligence (Rhone Research Group) – Troy, NY**
- Developing artificial intelligence models to accelerate the discovery of novel magnetic materials with applications in spintronics and data storage
- Bleeding-edge research at the intersection of Quantum materials and artificial intelligence

Fall 2022 | **Magnetic Moment Lab**
Experimental Physics
- Probed the physics of the interaction between a magnetic moment and magnetic fields.
- Measured the magnetic moment and its interactions with fields using the Teachspin Magnetic Torque apparatus.

Fall 2022 | **Optical Pumping**
Experimental Physics
- Verified how a cell filled with two Rubidium gas isotopes, ^{87}Rb and ^{85}Rb, absorbs light of specific wavelengths in response to temperature and static or time-varying magnetic fields.
- Observed the RF resonance phenomena and the transient effect.

Fall 2022 | **Earth Field NMR Lab**
Experimental Physics
- Measured the proton spin-lattice relaxation time of room temperature water.
- Confirmed the relationship between magnetization and magnetic field strength given by the Curie law.
- Compared the measured NMR signal, specifically the spin-relaxation time, of two different ionic solutions (Copper Sulfate and Sodium Chloride) from two separate sample bottles.
- Obtained an estimate of the magnitude of Earth's magnetic field by using Helmholtz coils to generate fields that add/subtract to the local field and change the free precession frequency of the protons in the water sample

Fall 2022 | **Compton Scattering Lab**
Experimental Physics
- Discussed radiation safety and factors to limit radiation exposure and lead safety procedures for shielding
- Investigated several effects of radiation from Cs-137 and Ba-133 using MAESTRO 7 software and a scintillation detector to take scans of incoming photons of certain energy
- Observed the inverse square law for radiation intensity, attenuation using copper sheets, and Compton scattering.
- Performed curve fits in Jupyter Notebook for analysis and determined the experimental differential cross section of the given material as well as the mass and classical radius of an electron

Fall 2022 | **Hall Effect Lab**
Experimental Physics
- Investigated the Hall effect and the electrical conductance of a Germanium crystal
- Performed functional fits (including SciPy's curvefit and ODR) of experimental curves in Jupyter Notebook for analysis

Fall 2022 | **Electronics Lab**
Experimental Physics
- Constructed circuit consisting of a pulse generator, voltage divider, operational amplifier, and high pass filter.
- Collected data using an Oscilloscope and analyzed data in Jupyter Notebook. Compared theory values with calculated values

Spring 2022 | **Shooting Method Simulation**
Quantum Physics 2
- Approximated eigenenergies of various wavefunctions and energy states by modeling quantum well states for a symmetric finite well
- Modified the shooting method code for application to spherical potentials

Spring 2021 | **Photoelectric Effect Lab**
Honors Physics 2
- Measured the photoelectric stopping potential for literature wavelengths using a High pressure - High intensity Mercury discharge lamp and Photoelectric sensor head to determine Planck's constant
- Fitted, plotted, and analyzed data as well as computed results and error using Excel and Jupyter Notebook

Experience

Apr 2020 - May 2020 | **Unity House of Troy – Troy, NY**
Art, Community, and Technology practicum
- Collaborated with employees and other students to develop strategies and outlines for youth engagement and outreach through social media to raise awareness about domestic violence

Mar 2020 | **The Sanctuary for Independent Media – Troy, NY**
Interviewer
- Interviewed a representative from Unity House's domestic violence program

Nov 2019 | **Olympic Broadcasting Services Broadcast Training Program (BTP) – Tokyo, JP**
Video Logger
- Elected volunteer and training in broadcasting
- Documented key visuals, animations, scores and other important information in the live broadcasts of Olympic events

Leadership and Activities

Aug 2021 - Ongoing | **GZ Basement**
Public Relations Officer
- Student-run, DIY arts and music space at RPI
- Shared relevant content on social media, designed flyers for events, and helped organize and run club events

Aug 2021 - Ongoing | **RPI Meitokukan Kendo**
Member
- Traditional Japanese style fencing and martial art

Technical Skills

Languages | English (Fluent), Japanese (conversational), French (basic)

Software | Jupyter Notebook, Google Colab, LaTex, Mathematica, Microsoft Excel, AutoCAD, Qiskit

Programming Languages | Python, Wolfram

Certifications

Apr 2022 - Apr 2025 | **Mental Health First Aid USA**