

Rose S. Perea

CONTACT INFORMATION

Vanderbilt University
cell: 575.621.1126
Department of Physics & Astronomy
6402 Stevenson Center
Nashville, TN 37235, USA

Email: rose.perea@gmail.com
rose.s.perea@vanderbilt.edu
<https://linkedin.com/in/rose-perea-b09a43a3/>

EDUCATION

Vanderbilt University, Department of Physics and Astronomy, Nashville, TN, USA
Doctoral Candidate, Aug. 2013-Current
Expected Graduation Date: Spring or Summer 2019
Dissertation Advisor: Dr. Todd E. Peterson

Fisk University, School of Natural Science, Nashville, TN, USA
M.A., Physics, Aug. 2011-Aug. 2013
Thesis Topic: "Temperature Variation of $\text{SrI}_2(\text{Eu}^{2+})$: Scintillation Properties and Device Testing of Instrumentation For Planetary Exploration"
Thesis Advisor: Dr. Arnold Burger

New Mexico State University, Las Cruces, NM, USA
M.S., Major: Physics, Aug. 2007-Aug. 2010
Thesis Topic: "Inter-site Partitioning of Fe in Wadsleyite at High Pressures"
Thesis Advisor: Dr. Boris Kiefer

New Mexico State University, Las Cruces, NM, USA
B.S., Major: Engineering Physics, Aug. 2002-May. 2007

RESEARCH EXPERIENCE

Physics and Astronomy Department Vanderbilt University and Vanderbilt University Institute of Imaging Science, Nashville, TN, USA: Graduate Research Assistant (Aug 2013-Current)

- Currently working with a double-sided striped (DSS) high-purity germanium (HPGe) detectors used at VUIIS for Single Photon Emission Computed Tomography (SPECT).
- Objective is to improve the position estimation of radiation interactions within the detector.
- Detector response was measured with a well collimated beam, data will be used in designing a position estimation scheme using maximum likelihood estimation.
- Once a positioning algorithm has been developed, it will be implemented in our dual-headed SPECT system for small-animal imaging.

Center for Research and Exploration in Space Science and Technology (CRESST), NASA Goddard Space Flight Center, Greenbelt, MD, USA: Summer Intern (06/2013-08/2013)

- Designed an experiment to compare the performance of two scintillator detectors, $\text{SrI}_2(\text{Eu}^{2+})$ and $\text{LaBr}_3(\text{Ce}^{3+})$ with a 6 MeV gamma-ray source, this is at the same site as the Probing in-situ Neutron and Gamma-ray experiment (PING) experiment.
- Obtained first (to our knowledge) measurement of nonproportionality of $\text{SrI}_2(\text{Eu}^{2+})$ at 6 MeV. In the range of 662 keV to 6 MeV the nonproportionality is 1.5 to 2 percent. This result was published in Oct. 2014 (see publications).

NASA Lunar and Planetary Science Academy, Goddard Space Flight Center, Greenbelt, MD, US: Summer Intern (06/2012-08/2012)

- Start of the beginning of experiment above.
- Gained experience on a geology field trip which included sites such as meteor crater, the Grand Canyon, and many inactive volcano sites in Arizona.

Fisk-Vanderbilt Masters-to-Ph.D. Bridge Program, Nashville, TN, US: Research Assistant (02/2011-8/2013)

- Performed a study on the effect of rising crystal temperature on the nonproportionality of $\text{SrI}_2(\text{Eu}^{2+})$ from 16 C to 60 C at energies from 81 keV to 1.2 MeV. Results showed that the nonproportionality increases with increasing temperature (up to a 6 percent increase). Full results were published along with the high-energy study mentioned above (see publications).

Configurable Space Microsystems Innovations and Applications Center (COSMIAC), Albuquerque, NM, US: Research Assistant (05/2010-08/2010)

- Worked as one of three graduate mentors in a team of undergraduates with diverse disciplines to build a lightning spectrometer. The spectrometer was to be used to detect lightning in the ionosphere and help to understand how the electromagnetic radiation propagates. Goal was to acquire a stand-alone system working on the ground before downsizing the system to fit in a satellite.
- Installed Network Time Protocol software to get accurate time stamps on a Macintosh in order to run a data manager from the United States Precision Lightning Network. This allowed us to stream real-time lightning strike data.
- Formally trained on the Cube Flow design system. This system allows designers to create modules for Space Plug-and-Play Avionics.

New Mexico State University, Las Cruces, NM, US: Research Assistant (08/2007-08/2010)

- Used first principles calculations using the VASP code (Vienna Ab-initio Simulation Package) to investigate the behavior of Earth minerals at high pressures.
- Performed electronic structure, ground state energy calculations of iron-bearing wadsleyite. Objective was to find out why iron prefers to partition itself in the second octahedral configuration out of three available sites.
- Results show that the second octahedral site is preferred due to energy constraints of the Si_4O_7 -tetrahedral groups. These results are reported in my thesis.

HONORS /AWARDS

- 2016 IEEE NSS/MIC Conference Trainee Travel Grant (for the Oct. 30-Nov. 6, 2016 conference)
- New Mexico 2015 Southwest Association of Student Assistance Programs (SWASAP) TRIO Achiever
- American Physical Society-Forum on Graduate Student Affairs (FGSA) Travel Award for Excellence in Graduate Research (March 2014)
- Center for Research and Exploration in Space Science and Technology (CRESST) Summer Internship Award (Summer 2013)
- Tennessee Space Grant (Summer 2012)

PUBLICATIONS

- "Mapping the Response of a Double-Sided Strip High-Purity Germanium Detector." IEEE NSS/MIC/RTSD 2017 Conference Proceeding, Nov. 10, 2017.
- "Scintillation properties of strontium iodide doped with europium for high-energy astrophysical detectors: nonproportionality as a function of temperature and at high gamma-ray energies. J. Astron. Telesc. Instrum. Syst. 1(1), 016002 (Oct 28, 2014)

FELLOWSHIPS /GRANTS

- Ruth L. Kirschstein National Research Service Award Individual Predoctoral Fellowship to Promote Diversity in Health-Related Research (Parent F31 - Diversity) (Fall 2016-Fall 2018)
- IGERT Scholar (2012-2013)
- Fisk-Vanderbilt Masters-to-PhD Bridge Fellowship (Fall 2011-Summer 2013)

PRESENTATIONS

- Perea, R., et al., "Mapping the Response of a Double-Sided Strip High-Purity Germanium Detector," poster presentation at the IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC), Nov. 2017 Atlanta, GA.
- Perea, R., et al., "Spatial Response of Double-Sided Strip Germanium Detector for Imaging," poster presented at the IEEE NSS/MIC, Nov./Oct. 2016, Strasbourg, France.
- Perea, R., et al., Double-Sided-Strip (DSS) High Purity Germanium (HPGe) Detectors for Small-Animal SPECT, oral presentation at the Center for Gamma-Ray Imaging: Small Animal Imaging Conference, University of Arizona, Jan. 2016, Tucson, AZ.
- Perea, R., et al., Effective Gap Width and Implications for Position Estimation in Germanium Strip Detectors, poster presented at the IEEE NSS/MIC, Nov. 2014, Seattle, WA.
- Rose Perea, et al., Scintillation Properties Of $\text{SrI}_2(\text{Eu}^{2+})$ for High Energy Astrophysical Detectors: Nonproportionality As a Function of Temperature and at High Gamma-Ray Energies, poster presented at the 2014 Symposium of Radiation Measurements and Applications (SORMA), Ann Arbor, MI.
- Perea R., Parsons, A.M. Testing and Characterization of $\text{SrI}_2(\text{Eu}^{2+})$: A Novel Material for Implementation as a Gamma- Ray Detector in the PING Experiment, poster presented at 2013 Summer College Intern Poster Session, NASA Goddard Space Flight Center, August 2013, Greenbelt, MD.
- Perea R., et al., Testing and Characterization of $\text{SrI}_2(\text{Eu}^{2+})$: A Novel Material for Implementation as a Gamma-Ray Detector as in the PING Experiment, poster presented at the Society for the Advancement of Chicanos and Native Americans in Science, October, 2012, Seattle, WA.
- Perea R., Parsons, A., Testing and Characterization of $\text{SrI}_2(\text{Eu}^{2+})$ for Implementation in the PING Experiment, poster presented at 2012 Summer College Intern Poster Session, NASA Goddard Space Flight Center, July 2012, Greenbelt, MD.
- Perea, R., Kiefer, B. Inter-site Partitioning of Iron in Wadsleyite at High Pressures, oral presentation at American Physical Society, March 2008, New Orleans, LA.

COLLABORATING RESEARCHERS AND INSTITUTIONS

- Dr. Ann Parsons and Dr. Suzanne Nowicki, NASA Goddard Space Flight Center. Helped perform the measurement at 6 MeV energies (facility designed by Dr. Nowicki).
- Dr. Lars Furenliid, University of Arizona: Center for Gamma-ray Imaging: Worked together a joint proposal to obtain beam time at the Advanced Photon Source (APS) at Argonne National Laboratory and also performed the first experiment there together. Currently collaborating on maximum likelihood analysis.

SKILLS

- Characterization of CZT using Pockels imaging
- Gamma-ray spectroscopy with HPGe, CZT, $\text{NaI}(\text{Tl})$, $\text{LaBr}_3(\text{Ce}^{3+})$ and $\text{SrI}_2(\text{Eu}^{2+})$ detector systems
- Radiation and Cryogenic Hazards training at Goddard
- C, and MATLAB Programming
- Monte Carlo N-Particle Code (MCNP, limited training)
- Igor Pro (technical graphing and data analysis software)
- Vienna Ab-initio Software Package (VASP, limited training)