Rodrigo G. Freundt

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Education

Cornelll University — Ithaca, NY
Ph.D. in Astronomy — 2021–Present

Pontifical Catholic University of Peru — Lima, Peru
B.S. in Electrical Engineering. Ranked top 10% of graduating class.) — 2011–2016

- Thesis: "Design of a LabVIEW-based polyphase filter bank spectrometer for radio astronomy using FlexRIO FPGA technology and CUDA-enabled GPU"

Experience

Graduate Research Assistant — Ithaca, NY
Working on multiple aspects of the CCAT/FYST project. — 2021 –Present

- Ultimately responsible for the mechanical design of the Epoch of Reionization Spectrometer (EoR-Spec). The EoR-Spec has been designed to probe the redshifted [C II] 158 μm fine-structure line emission from aggregates of galaxies in the early universe (z = 3.5 to 8).
- It features a detector array of more than 6000 Kinetic Inductance Detectors (KIDs) and a cryogenic, scanning Fabry-Perot Interferometer (FPI) that covers the full spectral range of 210-420 GHz with a resolving power of R $\sim$ 100.

Atacama Cosmology Telescope — San Pedro de Atacama, Chile
Site Engineer. Supervisors: Prof. Suzanne Staggs and Prof. Mark Devlin.) — Oct 2019 –Jul 2021

- Ensured the continuous and smooth operation of all of the telescope's subsystems, such as a the cryogenic cooling system (~90mK).
- Performed calibration procedures like the alignment of the receiver and the primary and secondary reflectors through high-precision photogrammetry (~10μm). Carried out frequency response measurements of the detector arrays through Fourier Transform Spectroscopy.
- Participated in the deployment of the Advance ACTPol low-frequency detector array (27/39 GHz). Assisted in the installation of the new chain of filters and cold silicon reimaging optics.

Management Solutions — Lima, Peru
Assistant Business Consultant — Sep 2018 –Jul 2019

- Worked in big data and bank stress test for a major local bank. Also worked in software development and data science for a leading financial institution in Madrid, Spain.

Institute for Radioastronomy — Lima, Peru
Research Assistant. Supervisor: Prof. Jorge Heraud — May 2017 –Aug 2018

- Worked in the design and construction of an 8-meter diameter radio telescope (RT8). Designed several hardware and software systems for the telescope's electromechanical pointing system.
- Assisted in the design and characterization of an hydrogen 21-cm line feedhorn and its RF over Fiber (RFoF) frontend. Developed an antenna test system based on a custom-made positioning goniometer and software-defined radio technology from Ettus Research.

Publications

[1] **R. Freundt**, Y. Li, D. Henke, J. Austermann, J. R. Burgoyne, S. Chapman, S. K. Choi, C. J. Duell, Z. Huber, M. Niemack, T. Nikola, L. Lin, D. A. Riechers, G. Stacey, A. K. Vaskuri, E. M. Vavagiakis, J. Wheeler, and B. Zou, "CCAT: A status update on the EoR-Spec instrument module for Prime-Cam", in *Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy XII*, vol. 13102, SPIE, Aug. 16, 2024, pp. 343–352.

[2] R. G. Freundt and J. A. Heraud, "Design of a LabVIEW-based polyphase filter bank spectrometer for radio astronomy using FlexRIO FPGA technology and CUDA-enabled GPU", in *2017 XXXIInd General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS)*, Aug. 2017, pp. 1–4.

Teaching

- **Teaching Assistant** at Cornell Univeristy — FA22, FA24, FA25
  Multiwavelenght astronmical techniques (ASTRO 4410)
- **Teaching Assistant** at PUCP — Aug 2017 - Dec 2017
  Space Science and Engineering (ING306)

Skills

- **Programming:** Python, C/C++, CUDA, LabVIEW
- **CAD:** Solidworks, KiCAD
- **Tools:** LaTeX, Git, Docker
- **Others:** Ansys Zemax Optics Studio, Wilderness Advanced Firt Aid (WAFA) certification

Scholarships and Awards

- Beca de Estímulo Académico Solidario (BEAS) — 2013–2016
  Fully-funded (tuition, health insurance and stipend) undergraduate scholarship for outstanding academic performance and financial need.
- Young Scientist Award — Aug 2017
  Merit-based registration fee waiver and travel grant to attend URSI 2017, Montreal, QC.
- Summer School of Astronomical Instrumentation, Dunlap Institute, UofT — Jul 2019
  Merit-based tuition waiver and travel grant. Toronto, ON.
- CASPER Workshop, Harvard & Smithsonian Center for Astrophysics (CfA) — Aug 2019
  Merit-based fee waiver and travel grant (invited, could not attend). Cambridge, MA.