Bruno Pollarolo

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SUMMARY

Senior undergraduate student in Electrical Engineering and Astronomy at Universidad de Chile, with two years of research experience in radio astronomy and a focus on scientific instrumentation and transient phenomena. I am a member of the AstroLab Research Group, where my work bridges engineering and astrophysics through digital signal processing, FPGA development on Xilinx AMD RFSoC platforms, and interferometer design, from analog front-end construction to digital correlation and data analysis. I am currently part of the Canadian–Chilean Array for Radio Transient Studies (CHARTS), a 300–500 MHz interferometric array for detecting fast radio bursts (FRBs) in the Southern Hemisphere.

EDUCATION

Universidad de Chile   2020–Present
Facultad de Ciencias Físicas y Matemáticas (FCFM)

B.Sc. in Electrical Engineering	2020–2024
Civil Electrical Engineering (*título profesional*)	2024–Present
	Thesis: Design and Implementation of the F-Engine for the Canadian–Chilean Array for Radio Transient Studies (CHARTS) project
B.Sc. in Astronomy	2020–Present

RESEARCH AND WORK EXPERIENCE

Intern, MWL, Universidad de Chile   Dec 2023 – Feb 2024

– Designed and implemented a PYNQ overlay in Vivado to generate arbitrary waveform signals (up to 64 MB of data).
– Programmed and transmitted waveforms through the DAC on the RFSoC 4x2, laying the groundwork for a programmable waveform generation module later integrated into CHARTS.
– Gained hands-on experience in FPGA design, hardware verification, and system-level debugging.

Guided Research (EL7850), DIE, Universidad de Chile   Mar 2024 – Jul 2024

– Extended a previous RFSoC-based transmission system to handle arrays up to 4 GB, enabling the generation and analog injection of synthetic FRBs for end-to-end system testing.
– Modeled FRB time-domain voltages using inverse Fourier transforms of dynamic spectra generated with `fitburst`.
– Conducted complete signal-chain validation from waveform synthesis to analog transmission, ensuring the stability and reproducibility of injected FRB-like signals.

Undergraduate Thesis, AstroLab, Universidad de Chile   Dec 2024 – Present
- Developing a complete digital spectrometer system for CHARTS.
- Implementing custom FPGA firmware for Xilinx RFSoC 4x2 to process multiple antennas on a single digitizer through demultiplexing.
- Key innovation: simultaneous demodulation of several antennas from a single ADC, enabling wide-bandwidth digitization of multiple 200 MHz channels.
- This system is central to CHARTS scalability, allowing a single digitizer to acquire data from up to 32 antennas within the 256-element array.

WORKSHOPS

Dunlap Institute Summer School 2025, University of Toronto   Jul 2025
- Built a two-element radio interferometer from scratch, including antenna construction, RF analog chain, and digital signal processing using and SDR.
- Strengthened international collaboration experience and practical understanding of low-frequency interferometry.

AWARDS AND CERTIFICATIONS

Recognized as an **Outstanding Student** during all years of study at the Facultad de Ciencias Físicas y Matemáticas (FCFM), Universidad de Chile — a distinction awarded annually to students with a GPA above **5.7** on the Chilean 1.0–7.0 scale.

Final GPA: 6.3 / 7.0 (Chilean) $\approx$ 3.7/4.0 (USA/Canada) $\approx$ 8.9/10 (Dutch).

2025 - Dunlap Institute Summer School registration and travel waiver ($1500 CAD)

Language Certifications
2023 – C1 TOEFL ITP (Seminarium Certification).

TEACHING ASSISTANTSHIPS

- **Advanced Calculus and Applications (MA2002)** — 5 semesters (2022–2025). Assistant professor conducting weekly problem-solving sessions on vector calculus, complex integration, Fourier series and transforms, and partial differential equations.

- **Analysis and Design of Electrical Circuits (EL3101)** — 1 semester (2023). Teaching assistant leading weekly sessions focused on circuit analysis and problem solving.

- **Applied Electromagnetism (EL3103)** — 3 semesters (2024–2025). Teaching assistant responsible for preparing and grading evaluation exercises, including wave guides, antenna and transmission lines problems.

OUTREACH ACTIVITIES

- Telescope Observation Monitor – Peñaflor y sus Estrellas (Nov 2021, Jan 2023). Participated in public outreach activities, guiding telescope observations. Contributed as a deep-sky astrophotographer.

- Telescope Observation Monitor – Día de la Astronomía (Mar 2022). Facilitated telescope sessions at the Centro Cultural Montecarmelo, Municipality of Providencia.

- AstroLab Outreach Event (Aug 2025). Presented the digital development of the CHARTS during

an event organized by the AstroLab research group and ElectroTutores at the Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.

Extracurricular Activities

- Amateur Astrophotographer – Deep sky and planetary photography at @franquis_astro.

- Member of Club Andino Universitario – Active in mountaineering and outdoor exploration @club_andino_universitario.

Computing Skills

Operating Systems	Windows, Linux
Programming Languages	Python, Matlab, Verilog
Markup Languages	LaTeX, TikZ
Software	Vivado, HFSS, Simulink (CASPER toolbox), LTspice

References

Dr. Tomás Cassanelli
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Dr. Juan Mena-Parra
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