

# Joseph Matthew Rodriguez Ruelas

josephrodriguez63638@gmail.com • 213.703.9620 • U.S. • [linkedin.com/in/jrodriguezruelas](https://www.linkedin.com/in/jrodriguezruelas)

---

## SUMMARY

Astrophysics student at UC San Diego with hands-on experience developing Python-based software systems, large-scale simulation pipelines, and data-processing workflows. Skilled in building modular codebases, implementing machine learning frameworks in PyTorch, and producing technical documentation. Former General Atomics intern experienced in scripting automation with Python and PowerShell, working in Linux- and cloud-based environments, and supporting system-level engineering operations. Comfortable with scientific datasets, feature extraction pipelines, and uncertainty-aware algorithms.

## EXPERIENCE

*School of Physical Sciences | UC San Diego, **Undergraduate Researcher***

*Apr 2025 - Present*

- Designed a physics-informed deep learning framework integrating multi-code population synthesis (COMPAS, COSMIC, POSYDON) as hierarchical Bayesian priors for joint simulation-based inference, raw-strain domain adaptation, and gravitational-wave likelihood modeling.
- Built an end-to-end inference pipeline, raw-strain CNN/Transformer encoders, physics-aware simulation embeddings, and normalizing-flow posteriors, that estimates formation-channel probabilities with decomposed epistemic vs. aleatoric uncertainty and supports large-scale synthetic population generation (local + AWS).
- Developed a falsification and interpretability engine using cross-code mutual-information tests, uncertainty-dominance criteria, adversarial/OT domain alignment, and cross-modal attention correlations ( $\alpha(\text{CE})$ ,  $\sigma_{\text{kick}}$ ,  $\beta_{\text{MT}}$ ) to validate or reject astrophysical formation-channel hypotheses.

*General Atomics, **Infrastructure Systems Intern***

*Jun 2025 - Aug 2025*

- Built and managed end-to-end server environments across cloud and on-prem infrastructure (Windows/Linux VMs, AWS EC2), performing provisioning, security configuration, and decommissioning tasks, including hands-on work in GA data centers.
- Developed automation tools in PowerShell, Microsoft Orchestrator, and Python to identify undecommissioned assets, auto-generate compliance reports, and improve latency diagnostics through AKIPS API, reducing troubleshooting time and operational overhead.
- Led AI adoption initiatives: delivered LLM demonstrations to 30+ interns and facilitated a panel for 150+ employees, highlighting practical pathways for AI integration. Implemented AI solutions for internal Infra Ops, creating an AI expert for onboarding documentation and also a networking expert to assist with real-time troubleshooting in AKIPS.

*SPACES at UC San Diego, **Academic Success Program Coordinator***

*Jun 2024 - Jun 2025*

- Directed UCSD's largest equity-focused textbook program, serving 890+ students annually with 1,700+ inventory items and a \$55K budget; implemented risk-mitigation strategies to maintain operational stability during peak demand.
- Optimized backend analytics and data pipelines using Python, Excel, and Kuali, doubling application processing speed and enabling inventory-informed purchasing decisions based on demographic and trend analysis.
- Expanded program reach through strategic partnerships with the Library, Bookstore, and campus orgs; led a 100+ student survey on course-material affordability and presented findings to the UCSD Academic Senate.

## EDUCATION

*UC San Diego*

*Bachelor's Degree • **Astronomy and Astrophysics***

## SKILLS

Automation • PyTorch • Python (Programming Language) • Machine Learning • Amazon Web Services (AWS) • Uncertainty Quantification • Data Analysis • High Performance Computing (HPC) • Data Engineering • Jira

## HONORS & AWARDS

***HSF Scholar***

*Hispanic Scholarship Fund •*

*Awarded for academic excellence and leadership.*