Juan Pablo **Alfonzo**

Astrophysics Graduate Student · Astrostatistics · Galaxy Formation & Evolution

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Summary

My research lies in the area of **galaxy evolution and formation** within astrophysics. My research area in particular is very programming/computationally heavy. I like describing my area of research as an **intersection between astronomy, statistics, and computer science**, specifically **machine learning and deep learning**. A lot of the work I have done and hope to continue doing heavily involves programming and using Python based algorithms. These algorithms have a heavy emphasis on machine learning and **artificial neural networks** to help answer research questions associated with galaxy evolution and formation.

Education

Tohoku University (東北大学)

Sendai, Japan

PhD in Astronomy — *Oct. 2022 - Apr. 2027*

- Supervisor: Prof. Masayuki Akiyama（秋山正幸教授）
- **IGPAS Program**

University of Toronto

Toronto, Canada

Hons. BSc. in Astronomy and Physics — *Sept. 2017 - Jun. 2021*

- Math minor and Philosophy minor

Research Experience

Tohoku University (東北大学)

Sendai, Japan

Graduate Student Researcher — *Oct 2022- Present*

- Working on applying **machine learning and deep learning techniques** to problems in various areas of astronomy
- Primarily interested in extra-galactic astronomy
- Supervisor: Prof. Masayuki Akiyama（秋山正幸教授）

University of Toronto

Toronto, Canada

SURP Researcher/ Research Scholar — *May 2021 - Sept 2022*

- Working on **training a convolutional neural network (CNN) to classify galaxies in the MaNGA survey**, while studying what features of the galaxies the neural network is focusing on to make the classification with the use of **CAM methods**.
- Network being created and trained using the **pytorch** Python package and working in a **Linux based environment** and using **Google Colab**
- Final goal is to have the CNN be able to predict the star forming history of the galaxies from their visual image and spectral information. Aim to **not only having a working CNN but to be able to pick it apart to understand how it is making decisions and extract relevant physics**
- Project Supervisor: Dr. Kathreik Iyer (Dunlap Institute)

University of Toronto

Toronto, Canada

Undergraduate Researcher — *Aug. 2020 - Apr. 2021*

- Investigated morphological changes in galaxies as they evolve in time, by studying their internal kinematics using the MaNGA survey.
- Analysis being done using Python based code with **heavy use of machine learning algorithms such as DB scan and PCA** from the **sci-kit learn** library. Full write up of project can be found **here**
- **Unique use of PCA** which focused more on using the actual PC vectors rather than using them as the basis in a PC profile plot
- Project Supervisor: Dr. Mubdi Rahman (Dunlap Institute)

Presentations and Talks

East Asian Young Astronomers Meeting 2024

Chiang Mai, Thailand

Poster Presentation — *Jan 30 - Feb 2, 2024*

AI-Driven Discovery in Physics and Astrophysics

Kashiwa, Japan

Flash talk Presenter — *Jan 22 - Jan 26, 2024*

Machine Learning in Astronomical Surveys (IAP/CCA 2023)

Paris, France & New York, USA

Poster Presentation — *Nov 27 - Dec 1, 2023*

Resolving Universe — *Tokyo, Japan*
Poster Presentation — *Nov 5-10, 2023*

GPPU School — *Sendai, Japan*
Poster Presentation — *Sept 28, 2023*

Statistical Challenges in Modern Astronomy VIII — *State College, USA*
Poster Presentation — *June 12-16, 2023*

ART (Astrostats) Meeting — *Toronto, Canada*
Seminar Talk — *Mar. 30, 2023*

9th Galaxy Evolution Workshop — *Kyoto, Japan*
Contributed Talk — *Feb. 21, 2023*

HSC-AGN Meeting 2022 — *Kagoshima, Japan*
Contributed Talk — *Dec. 2, 2022*

SDSS Collaboration Meeting 2021 — *Baltimore, USA*
Presenter in Data 1 Series and Lighting Talk 1 Series — *Aug. 11, 2021*

Awards

GPPU Applicant Travel Funding — *Chiang Mai, Thailand*
Poster Presenter — *Jan 29 - Feb 3, 2024*
- Secured full travel and accommodation funding to present a poster at East Asia Young Astronomers Meeting 2024 in Chiang Mai, Thailand (¥200,000)

AI-Driven Discovery in Physics and Astrophysics Travel Funding — *Kashiwa, Japan*
Workshop Attendee & Presenter — *Jan 22 - Jan 26, 2024*
- Secured full travel and accommodation funding to attend and present at an AI/ML x Physics/Astrophysics workshop. (¥50,000)

SUPER-IRNET Travel Funding — *Tokyo, Japan*
Poster Presenter — *Nov 5 - Nov 10, 2023*
- Secured full travel and accommodation funding to present a poster at an ALMA and JWST conference at Waseda University. (¥76,940)

SUPER-IRNET Travel Funding — *State College, USA*
Poster Presenter — *June 4- June 17, 2023*
- Secured full travel and accommodation funding to attend an astrostats summer school and to do a poster presentation at an astrostats conference at Penn State. (¥734,525)

9th Galaxy Evolution Workshop Travel Funding — *Kyoto, Japan*
Contributed Talk Speaker — *Feb 19-25, 2023*
- Secured full travel and accommodation funding from the conference (¥66,004)

HSC-AGN f2f Meeting Travel Funding — *Kagoshima, Japan*
Contributed Talk Speaker — *Nov 29-Dec 3, 2022*
- Secured full travel and accommodation funding from the conference (¥98,623)

2022 Embassy Recommended Research MEXT Scholar — *Sendai, Japan*
Graduate Student — *Oct 2022 - Present*
- The Japan Ministry of Education, Culture, Sports, Science and Technology (in Japanese: Monbukagakusho, English acronym: MEXT) offers scholarships to Canadian students wishing to pursue their studies at a Japanese university. For graduate studies (non-degree, masters or doctorate) in any university subjects. Scholarship provides: full tuition coverage, monthly allowance, round-trip between Canada and Japan, and Japanese language training. Information can be found **here** (≈ ¥5,100,000)

2021 SURP Top Poster Award — *Toronto, Canada*
Poster Presenter — *Aug 13, 2021*
- Won top poster award for poster conference that was held to summarize all research projects carried out in the SURP program at the University of Toronto in the summer of 2021 ($50)