

日本天文学会早川幸男基金渡航報告書

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所属機関	国立天文台
職あるいは学年	研究員
任期 (再任昇格条件)	1 年 (再任不可)
渡航目的	Invited talk at the "APOGEE ' s Galactic Odyssey" conference
講演・観測・研究題目	JASMINE: high precision astrometry for the dynamics of the Galactic centre and high cadence photometry for the search of habitable exoplanets.
渡航先 (期間)	Spain(2026 年 8 月 10 日～8 月 14 日)

I attended the "APOGEE ' s Galactic Odyssey" , which took place from August 9th to the 14th, without any issues.

On Wednesday 12th I gave my talk, where I described the goals and means of the JASMINE mission, with especial emphasis on my work developing the astrometric reduction pipeline. The talk got a lot a praise and people were interested in the synergies between APOGEE, an spectroscopic survey of, among other things, the Nuclear Region of the Milky Way, and JASMINE, which provides the missing components of the phase-space (i.e. the transversal velocities). I also took the chance to try and open up new collaborations with the United States, as most researchers present at the conference came from USA. Hopefully, this will result in more interest for the mission overseas and, ideally, give us access to more antennas with which to download additional data to the ground, thus increasing the scientific output of the JASMINE mission.

The meeting was very productive, as it not only allowed me to get up to speed with the state-of-the-art in Galactic Archaeology, but it resulted also in many fruitful discussions. I expect several projects and new collaborations to come out of this conference:

- Exporting my expertise in astrometry to reduce the ROMAN space telescope data: I met with Dr. Rachael Beaton, a person well position within the ROMAN space mission and knowledgable about the data access and computation resources available. As such, we are currently exploring ways for me to run the software I am developing for JASMINE on the ROMAN data. This will provide them with the best possible astrometric catalogue and me with hands-on experience and a chance to improve my code.

- Collaborating with professors at CEFCA on the observation of extra-galactic stellar streams using SUBARU: given my expertise in stellar streams and the fact that I can apply for observing time at SUBARU, we are planning a new proposal to characterise the nature of Dark Matter using the tidal features surrounding nearby galaxies.
- Determining the origin of the "young" alpha-rich and the intermedia-age RR Lyrae stars: I am currently collaborating with the team in Uruguay trying to decipher the formation channel of the newly found intermedia-age RR Lyrae. At the conference, however, I learned about a similar type of mysterious stars that are being refereed to as "young" alpha-rich. Neither should exist based on our current theories of stellar evolution so by joining efforts between both teams we can dig deeper into the role of stellar binarity in the formation of these odd stars.
- An auto-differentiable version of the Besançon Galaxy Model (BGM): in the conference I met the mother of the most popular Milky Way synthesis model, Prof. Emeritus Annie Robin. After discussing their recent effort to re-write the entire software to Python, I offered my expertise in JAX to explore the feasibility of making the BGM auto-differentiable. If possible, this would be revolutionary, as we would readily obtain the derivatives of a very complex, non-linear model which, in turn, would greatly improve the efficiency and accuracy of the fits to the data.

Acknowledgements

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