

# FRANCESCA BORG

✉ francesca.borg04@gmail.com · 🌐 · 🐙 · in · ID

## RESEARCH INTERESTS

---

Galactic dynamics – Stellar astrophysics – Milky Way archaeology – Computational simulations

## RESEARCH EXPERIENCE

---

### “A risk assessment on exposure to radon in residential environments in Malta” - University of Malta

Jul 2023 – Sep 2023

*Research support assistant for the National Commission for the Protection from Ionising and Non-Ionising Radiation, Supervisors Prof. Noel Aquilina, Dr Lourdes Farrugia*

In-depth assessment of the risk of lung cancer posed to the Maltese population by indoor radon gas concentrations in residential dwellings, including an in-depth review of the literature as well as numerical computations using statistics on Maltese demographics and local trends in smoking habits and formal presentation of the findings to the Commission.

### “The stellar populations trapped at the L4/L5 Lagrange (corotation) points of a bar” - University of Malta

Sep 2022 – Jun 2023

*B.Sc. thesis, Supervisors Prof. Joseph Caruana, Prof. Victor P. Debattista*

**Abstract:** Bars are prevalent features in disc galaxies and play an important role in driving secular evolution, especially through resonances. Stars at corotation resonance with the bar are known to librate around the stable Lagrange points (L4, L5). Here, we investigate the properties of corotating stars by performing an orbital frequency analysis on a subsample of stars in an N-body+SPH galactic simulation to obtain corotating and non-corotating subsamples. Trends in variation of ages and metallicities are investigated by sectioning the galactic plane into radial and azimuthal bins, and comparing the properties of both categories of stars within each bin, using a K-S test to check statistical significance. We confirm the existence of important systematic differences between the distributions of the ages and metallicities of the corotating stars with respect to the surrounding non-corotating stars. Trends in age are found to vary radially and suggest that corotating stars are dragged away from the corotation radius in both directions, whereas the metallicities of stars in corotation are found to be distinctly higher.

### Galactic simulations research project - University of Malta

Jul 2021 - Sep 2021

*Supervisors Prof. Joseph Caruana, Prof. Victor P. Debattista*

Processing and analysis of a galactic simulation using Python, particularly PyNbody and AGAMA packages. Tasks included rendering galactic components, extracting statistics from data to produce plots, and identifying and analysing trends.

## CAREER & EDUCATION

---

### Master in Astrophysics and Space Science (EMJM MASS)

Sep 2023 – present

S1 Università degli Studi di Roma Tor Vergata, Italy

28/30

S2 University of Belgrade, Serbia

93/100

S3 University of Belgrade, Serbia

ongoing

### Bachelor of Science (B.Sc.) (Hons) in Mathematics and Physics

Sep 2019 – Jun 2023

Faculty of Science, University of Malta, Malta

First Class Honours

### ERASMUS Exchange in Mathematics, Physics, Astrophysics

Sep 2021 – Jun 2022

School of Mathematics, Cardiff University, UK

A+

## SEMINARS & TALKS

---

### Attended seminars and talks:

**MASS Summer School 2024**, Université Côte d’Azur (France) *15 – 19 Jul 2024*  
“Observational astronomy and data processing”.

**7th Institute of Space Sciences (ICE-CSIC) Summer School** (Spain) *2 – 11 Jul 2024*  
“Multiwavelength Approach to Exoplanets”.

**Gravitational Wave Open Data Workshop #7 (2024)**, GWOSC *18 – 20 Apr 2024*  
Crash-course in gravitational-wave data analysis.

**MASS Winter School 2023/2024**, Università degli Studi di Roma Tor Vergata *15 – 19 Jan 2024*  
“From Stars to Cosmic Explosions: Bridging Scales in Astrophysical Data Analysis”.

### Contributed seminars and talks:

**ICPS 2024**, Free University of Tbilisi (Georgia) *4 – 11 Aug 2024*  
Poster presentation of undergraduate thesis “The stellar populations trapped at the L4/L5 Lagrange (corotation) points of a bar”.

**XIII SAW**, Astronomical Society “Ruđer Bošković” (Serbia) *18 May 2024*  
Talk presenting undergraduate thesis “The stellar populations trapped at the L4/L5 Lagrange (corotation) points of a bar” at the 13<sup>th</sup> Student’s Astronomical Workshop.

**Short Review Paper Seminar (PHY3208)**, University of Malta *22 May 2023*  
Talk presenting short review paper titled “First light and the James Webb space telescope”.

**Physics Seminar and Poster Session (PHY3209)**, University of Malta *18 – 19 May 2023*  
Talk and poster presentation of undergraduate thesis “The stellar populations trapped at the L4/L5 Lagrange (corotation) points of a bar”.

**S-Cubed’s Annual Science Conference**, University of Malta *19 Apr 2023*  
Talk presenting undergraduate thesis “The stellar populations trapped at the L4/L5 Lagrange (corotation) points of a bar”.

## HONORS & AWARDS

---

- ICPS 2024 Fee Waiver Award.
- Erasmus Mundus Joint Master (EMJM) scholarship for MASS (2023 entrance).
- Certificate of Merit in recognition of high quality of research in undergraduate thesis (2022 – 2023).
- Dean’s List for the Faculty of Science in recognition of academic achievement during academic years 2021 – 2022 and 2022 – 2023.

## TECHNICAL STRENGTHS

---

<b>Programming</b>	Python, Java
<b>Software &amp; Tools</b>	L <sup>A</sup> T <sub>E</sub> X, Linux OS, SQL, Mathematica, Excel
<b>Languages</b>	Maltese (Native), English (Native), German (B1), Italian (A1)

## EXTRACURRICULAR ACTIVITIES

---

- Volunteer o.b.o Institute for Space Sciences and Astronomy (ISSA) at the University of Malta Open Day for secondary schools (Dec 2022).
- Mediterranean Youth Mathematical Championship (MYMC) participating as part of the Maltese team (Jul 2019).