The Center for Astrophysics and Cosmology (CAC) at the University of Nova Gorica in Slovenia has an opening for 1 (one) **PhD student position** as part of the TALES (Time-domain Analysis to study the Life-cycle and Evolution of Supermassive black holes) Doctorate Network, with starting date in October 2025.

The CAC is active in research fields of astrophysics and astroparticle physics and actively participates in several large international collaborations: Vera Rubin Observatory LSST, Gaia, Fermi LAT, Cherenkov Telescope Array, and Pierre Auger Observatory. CAC is leading a large European project which focuses on machine learning applications in science and humanities, SMASH (https://smash.ung.si/). The CAC benefits from the proximity of several institutions with strong expertise in astronomy and astroparticle physics such as SISSA, INFN and IFPU in Trieste.

The PhD project topic will be **identification and characterisation of Tidal Disruption Events discovered by Vera Rubin Observatory**, and will be conducted under the supervision of Prof. Andreja Gomboc.

Description of the research project:
This PhD project focuses on using Tidal Disruption Events (TDEs) detected in optical by Vera Rubin Observatory's LSST (expected to start in 2025) to study their multi-wavelength properties (using also data from other instruments, e.g. Einstein Probe) and significantly increase the sample of known TDEs. Rubin's LSST will detect and alert on the order of millions of transient events every night, among which there will be about 10 TDEs. The aim of this project is to develop and use innovative machine-learning-based algorithms to identify TDEs, and compile systematically selected samples of high-confidence optical TDEs. Together with theoretical models of TDEs long-term evolution, this data will be used to constrain the properties of the supermassive black holes and disrupted stars, address the physical nature and location of optical and X-ray emission and the connection between TDEs and Quasi-Periodic Eruptions (QPEs). Possible side-product of the project could be identification of extreme outliers leading to potential discoveries of new types of transients.

The TALES doctorate network in a nutshell
The offered PhD position is part of the TALES (Time-domain Analysis to study the Life-cycle and Evolution of Supermassive black holes) Doctorate Network, a consortium of 10 astrophysics research groups, 8 industrial and 4 academic partners spread across Europe that aims to study the feeding and feedback cycle of supermassive black holes. The TALES doctorate candidates will (i) leverage time-domain astronomy observations from state-of-the-art facilities to map the inner environments of supermassive black holes, (ii) use novel analysis methods from the discipline of data science to maximise the information gain from the observations and (iii) develop new theories and models to interpret the data and learn about the physics of the life-cycle of black holes at the centres of galaxies. Parallel to the core research activities above, TALES aspires to implement an ambitious training programme on both technical and complementary skills that is tailored to the needs of the doctorate candidates and includes secondments to industrial and/or academic partners as well as specialised lectures and science communication events.

Skills/Qualifications

- Master of Sciences in physics / astrophysics.
  The selected candidate not having completed the Master study when applying to the tender must complete the Master study by 15 September at the latest.
- Proficiency in English, both written and spoken.
- Solid computational background.
- Strong writing and communication skills compatible with an entry-level research position.
- Ability to work independently and take initiative.
- Effective teamwork skills and collaborative mindset.

Specific Requirements

The successful candidate will engage in a rigorous PhD program that involves a demanding travel schedule, including mandatory secondments with both industrial and academic partners. Participation in a variety of training sessions, dissemination activities, and outreach events will also be required. Given the nature of the program, the ability to adapt quickly to new environments and a willingness to travel frequently are essential.

Benefits

The successful candidate will be offered a 36-month full-time employment contract with a competitive gross annual salary of approximately €30,000.00 per annum, which includes health insurance and a pension scheme, plus mobility and family allowances as applicable and in line with the EC rules for Marie Sklodowska Curie Doctoral Networks and national legislation.

The recruited researcher will have the opportunity to work within an international and multidisciplinary team that includes 11 doctoral candidates spread in 10 universities across Europe, a total of 14 astrophysics research groups and 8 industrial partners that are active in the fields of data science or education.

As part of the TALES Doctorate Researcher program, the candidate will benefit from a wide range of professional and personal development opportunities through targeted training events. They will acquire a unique skill set that bridges astrophysical modeling, astronomical observations, and data science, positioning them at the forefront of interdisciplinary research in these fields.

Eligibility criteria

The following conditions apply to the offered position:

Applicants must be Doctoral Candidates, i.e., not already in possession of a doctoral degree at the date of the recruitment. Researchers who have successfully defended their doctoral thesis but who have not yet formally been awarded the doctoral degree will not be considered eligible.

Trans-national mobility: The applicant — at the date of recruitment — should not have resided in the country where the research training takes place for more than 12 months in the 3 years immediately prior to recruitment, and not have carried out their main activity (work, studies, etc.) in that country. For refugees under the Geneva Convention (1951 Refugee Convention and the 1967 Protocol), the refugee procedure (i.e. before refugee status is conferred) will not be counted as 'period of residence/activity in the country of the beneficiary'.

Selection process

Interested applicants are invited to submit a motivation letter, curriculum vitae including a description of their research experience and university transcripts to careers@ung.si by April 1st, 2025. In addition, applicants should arrange for two letters of recommendation to be sent directly to the same email address by the application deadline.

Following the initial screening of the applications, a short list of up to 5 candidates will be invited to interviews that will consist of a 15 minutes oral presentation by the applicants on their research experience and up to 45 minutes of questions and general discussion.

Informal inquiries regarding the position can be directed to Prof. Andreja Gomboc at andreja.gomboc@ung.si. The successful candidate will commence their appointment in Autumn 2025.

The selection process will adhere to the Code of conduct for the recruitment of researchers