

CALL FOR AWARDING RESEARCH FELLOWSHIPS WITHIN PROJECT GRANTS AND R&D INSTITUTIONS

Research fellowship within the project YoBD

1 Research Fellowship(s) (Bolsa de Investigação (BI)) for a person holding a bachelor's degree is open at the **FCiências.ID – Associação para a Investigação e Desenvolvimento de Ciências**, for the project **“Young brown dwarfs as testbeds for star and planet formation”**, with number PTDC/FIS-AST/28731/2017 financed by FCT under the **Programme All Scientific Domains** under the following conditions:

1. **Scientific Area:** Astronomy & Astrophysics

2. **Requirements for admission:**

- (a) Holder of a Bachelor's degree in the area in the area of Astronomy & Astrophysics, Physics, or a related field.
- (b) Fluency in spoken and written English language.
- (c) Motivation for pursuing research related to observation of young brown dwarfs and stellar clusters.

3. **Factors preferred:**

It will be positively considered, but not required:

- (a) Working knowledge of some of programming languages or software used in astronomy (e.g. Python, IDL, SQL, TopCat, ds9)
- (b) Previous research experience in the field of observational astronomy.

4. **Work plan:**

The origin of brown dwarfs is one of the great unsolved problems in the field of stellar and planetary physics. Brown dwarfs are objects intermediate in mass between stars and planets and can be considered, broadly speaking, either stars that did not obtain sufficient mass to achieve stable hydrogen fusion, or giant planets ejected early on from their planetary systems. We know now that young star forming regions and clusters harbour large numbers of brown dwarfs, but due to their intrinsic low brightness, their population is still poorly characterized. This is particularly true below ~ 20 Jupiter masses, where the masses of brown dwarfs overlap with those of extrasolar giant planets. Studies in this mass regime are rare, but precious, as they hold important clues for understanding the origins of these curious objects. In this project, we aim of obtaining the full picture of the low-mass stellar and brown dwarf population of Corona Australis, a young (1-2 Myr) region showing active star formation, and located at the distance of ~ 130 pc. We will use the extremely deep optical and near-infrared imaging data obtained with the Subaru (8-m) and VISTA (4-m) telescopes, to search for cluster candidate members with masses as low as 5 Jupiter masses. By using the observations in H_{alpha} filter, we will search for stars and brown dwarfs that are actively accreting material from their surroundings, and cross-match our results with the Spitzer Space Telescope catalogs sensitive to objects with protoplanetary disks. This will be combined with the unprecedented astrometry (proper motions and parallaxes) provided by the Gaia space mission, which will allow us to uniquely characterize the stellar part of Corona Australis for the first time. Apart from contributing significant new insights in the science of low-mass star and brown dwarf formation, this project will provide the prospective student with several technical competencies important for observational astronomy studies: (1) data reduction in the optical bands, based on the images taken with Suprime-Cam instrument at the Subaru Telescope, (2) measuring stellar photometry from the images and calibrating it, (3) search and manipulation of large astronomical catalogs, and their cross-matching, (4) different cluster membership selection methods, based on both photometry and astrometry.

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This work is expected to produce the most complete picture of stellar and substellar population of Corona Australis, and should lead to an article in one of the leading astronomy journals. Furthermore, the work is expected to be incorporated into the student's Master thesis.

5. **Legislation framework:** Statute of the Scientific Research Fellowship, in accordance with Law 40/2004, of 18 August, as amended and republished by Decree-Law No. 202/2012 of 27 August, and as amended by Decree-Law No. 233/2012 of 29 October and by Law No. 12/2013, of January 29, and Decree-Law No. 89/2013 of 9 July; And also by the FCT, I.P. Fellowships Regulation, in force (<https://www.fct.pt/apoios/bolsas/docs/RegulamentoBolsasFCT.pdf>) and FCIências.ID Fellowship Regulation, as approved on 23rd February 2017.

6. **Place of work:** The work will be developed at CENTRA – Center for Astrophysics and Gravitation, at the Faculty of Science of the University of Lisbon, under the scientific guidance of Dr. Koraljka Muzic and Dr. Karolina Kubiak.

7. **Fellowship duration:** This position is initially opened for 6 months and will begin in November, 2019, or upon agreement. The fellowship contract may be renewed to more 6 months, in accordance with the provisions of Regulation of Research Fellowships from the Foundation for Science and Technology, I.P.

8. **Monthly allowance:** The fellowship amounts to € 752,38, according to table values of the fellowships awarded directly by the FCT, IP. (<http://www.fct.pt/apoios/bolsas/valores>). The fellowship holder will have a personal accident insurance and, if not covered by any social protection scheme can ensure the right to social security through adherence to the voluntary social insurance scheme, pursuant to Código dos Regimes Contributivos do Sistema Previdencial de Segurança Social. The fellowship will be paid monthly by bank transfer.

9. **Selection method:** Candidates will be assessed by the quality of their CV (50%) and the interview (50%). to 3 best candidates according to the CV assessment will be invited for an interview. Interviews may be held in person at FCUL, or by video-connection (Skype, Zoom). The committee reserves the right not to select any of the candidates, if a well justified motivation exists.

10. **Selection Committee:**
President: Dr. Koraljka Muzic (CENTRA, FCUL)
Member: Dr. Karolina Kubiak (CENTRA, FCUL)
Member: Prof. Dr. Andre Moitinho de Almeida (CENTRA, FCUL)
Alternate member: Dr. Alberto Krone Martins (CENTRA, FCUL)

11. **Publication/notification of results:** The final results of the evaluation will become public, through ordered list *final grade obtained* which will be posted at the entrance hall of the FCIências.ID, located at the Faculdade de Ciências da Universidade de Lisboa, C1 bdg – 3rd floor, Campo Grande, 1749-016 Lisboa, and the selected candidate will be notified by e-mail.

12. **Deadlines:** This call for applications is open from 28th October to 11th November 2019.

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13. **Application:** Applications may be sent via e-mail to kmuzic@sim.ul.pt, by attaching the following documents:

- (1) *Curriculum vitae;*
- (2) *Motivation letter describing the previous study and research experience (if applicable), and motivation to pursue research under the mentioned topic;*
- (3) *Certificate of qualifications (bachelor's degree)*

NOTE: Please note that Degrees obtained in foreign countries need a Portuguese Recognition certificate issued by a Portuguese high degree Institution, according to the [Decree-Law nr. 66/2018](#), of august 16th and the [Ministerial Order nr. 33/2019](#), of January 25th. The presentation of such certificates is mandatory for contract signature. More information can be obtained in: <https://www.dges.gov.pt/en/pagina/degree-and-diploma-recognition>.