Application form

This application form should be accompanied by a current CV, list of publications, grants and distinctions plus a brief statement of why you wish to apply for this position, indicating how your skills, past achievements, qualifications, experience and personal qualities make you suited for this job and what contribution you would expect to make if appointed.

Please copy these details into the space provided from Page 3.

Vacancy details

Post applied for	**Postdoctoral Research Associate in Psychosis Studies**
Post reference number	**THW/18/059639/000100**
Candidate number (for King's use only)	

Personal & contact details

Title	**Mr**	
Forename(s)	**Rafael**	
Surname	**Garcia Dias**	
Home address & postcode	**Carr. Gen. Cuesta-Taco, 18, 3F, Tenerife, Spain, 38320**	
Personal email	**rafaelagd@gmail.com**	
Personal telephone	**+34635397483**	
Work email	**rafaelgd@iac.es**	
Work telephone	**+34 922605269**	
May we contact you at work if necessary?	☒ Yes ☐ No	
Would you require a Certificate of Sponsorship to take up this post?	☒ Yes If you already hold a UK visa please provide details of the visa and expiry date:	☐ No Please advise why you are eligible to work for King's College: ☐ I am a UK/European Economic Area National ☐ Other, please state:

Employment details

Notice period	**No**
Have you been employed by King's College London before? If so, please give job title(s) and dates of employment:	**No**
Please give your present/last annual salary, and details of any additional benefits/allowances: Please include details of any upcoming pay increments as appropriate. N.B.: Salary details of appointee may be verified.	**1300€ monthly**

References

Please provide the names and addresses of two referees (one of whom should normally be your manager/supervisor at your current workplace). For recent graduates, your personal tutor could also be appropriate. Relatives may not be given as referees.
It would be very helpful if you could provide details of a third referee whom we could approach if one of the other two is unavailable prior to the interview or if you would not like us to contact your current employer.

	Reference 1 (current employer)	Reference 2 (Previous Employer/Academic Referee)
Name:	**Carlos Allende Prieto**	**Jorge Sánchez Almeida**
Job title of referee:	**Research Professor**	**Research Professor**
Relationship to you:	**Supervisor**	**Cosupervisor**
Tel. no.:	**+34 922605421**	**+34 922605233**
Email:	**callende@iac.es**	**jos@iac.es**

	Additional reference (Previous Employer/Academic Referee)	If you are invited to interview, for academic positions references will be required prior to the interview. If this is the case are you happy for us to contact your referees? ☒ Yes Please would you make your referees aware that we may be contacting them shortly for a reference. ☐ No We will **not** contact your current employer but we may contact referees two and three so please would you make them aware that we may be contacting them shortly. **For research position references will not be requested prior to interview.**
Name:	**Charles José Bonatto**	
Job title of referee:	**Research Professor**	
Relationship to you:	**Former supervisor**	
Tel. no.:	**+55 51 33087111**	
Email:	**charles.bonatto@ufrgs.br**	

Data protection statement

Access to this information will be restricted to a limited number of authorised university staff. The information may also be used for the purposes of compiling employee statistics and equal opportunities monitoring.

For those staff who hold honorary contracts with the NHS, the data may be shared with your honorary employer.

I give my consent to this information being processed and stored (by means of a computer database or otherwise) as described above, for the duration of my contract of employment and to fulfil the statutory, or recommended, retention periods when I am no longer an employee at King's College London.

I confirm that all the information given on this form is complete and correct by printing my name below.

PRINT NAME: **Rafael Augusto Garcia Dias** **DATE:** **16/01/2017**

Please note that failure to disclose relevant details or a deliberate attempt to falsify information may lead to dismissal.

Rafael Garcia-Dias

Post-doctoral application for King's College London

Cover letter

Dear Professors Andy King,

What most called my attention to this position was the possibility of working directly with a computer scientist of your level. Your previews works show a profound understatement of the field.

Since early in my career, I was mainly interested in programming applied to physics and astrophysics. Apart from coding been essential in modern astrophysics, I was particularly engaged in programming at a professional level. I have presented workshops on best coding practices at the institution I work, and I am dedicated to code better every day. Work directly with a computer scientist of your level would be just perfect to consolidate my abilities in this area. Moreover, I always wanted to work with neuroscience. This position is the ideal path for transitioning from my field to neuroscience applying the knowledge I gain over my years as astronomy researcher.

My entire Ph.D. was dedicated to applying machine learning to astrophysics. I have a broad background making science all the way from raw image data to the data tables. I have been coding Python since 2013, including high-level code using Sklearn and some experience with TensorFlow. I also have worked with R and C. Moreover, I have practice in the whole scientific process of posing a question, mounting the experiment, getting and processing the data, analysing the results and consolidating all the process with scientific insights on a publication. Additionally, I have some experience with web development, HTML, JavaScript, and Django framework.

If selected, I would contribute to the team improving the machine learning applications and pushing the limits of these tools to the neuroimage analysis. With my programming skills and my scientific background, I can contribute through the whole process, from developing the core deep learning application to building the interface for the best user experience.

I hope to have the opportunity to learn more about the project and provide more information about how I can be useful to the team in a future interview.

Sincerely,

Rafael Garcia-Dias

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Rafael **Garcia-Dias**

Curriculum Vitae

Education

2015–2018 **PhD in Astrophysics**, *Instituto de Astrofísica de Canarias - IAC.*

2013–2015 **Masters of Physics**, *Universidade Federal do Rio Grande do Sul - UFRGS.*

2013 **Physics Degree**, *Universidade Federal do Rio Grande do Sul - UFRGS.*

PhD Thesis

Title **Machine learning in high resolution spectroscopy**

Supervisors Allende Prieto & Sanchez Almeida

Masters Dissertation

Title **Spectroscopy and photometry of open clusters – Understanding the Galaxy chemical evolution**

Supervisors Professor Charles Bonatto & Professor Alan Alves-Brito

Publication List

Garcia-Dias et al. 2018 **Machine learning in APOGEE: Testing chemical tagging with open clusters**, In preparation.

Souto et al. 2018 **Chemical abundances of main-sequence, turn-off, subgiant and red giant stars from apogee spectra ii: signatures of diffusion in the open cluster M67 using aspcap**, In preparation.

Garcia-Dias et al. 2018 **Machine learning in APOGEE: Unsupervised spectral classification with K-means**, Accepted.

Abolfathi et al. 2017 **The Fourteenth Data Release of the Sloan Digital Sky Survey**, Preprint.

Casamiquela et al. 2017 **OCCASO II. Physical parameters and Fe abundances for 18 Open Clusters**, Published.

Blanton et al. 2017 **Sloan Digital Sky Survey IV: Mapping the Milky Way, Nearby Galaxies and the Distant Universe**, Published.

Albareti et al. 2016 **The Thirteenth Data Release of the Sloan Digital Sky Survey: First Spectroscopic Data from the SDSS-IV Survey MApping Nearby Galaxies at Apache Point Observatory**, Published.

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Muna et al. 2016 **The Astropy Problem**, Preprint.

Bica et al. 2015 **Bridge over troubled gas: clusters and associations under the SMC and LMC tidal stresses**, Published.

Courses

Nov. 28 - Dec 01, 2017 **ESAC DATA ANALYSIS & STATISTICS WORKSHOP 2017:** Covered fundamental topics in statistics and data analysis, including practical applications and advanced topics.

Nov. 13 - 17, 2017 **XXIX Canary Islands Winter School of Astrophysics on Applications of Radiative Transfer to Stellar and Planetary Atmospheres:** The advanced school dedicated to the fundamental physical processes in both stellar and planetary atmospheres, as well as the bases of the numerical treatment of radiative transfer, to form researchers with the background required to face the present and future challenges.

Oct. 02 - 03, 2017 **Early Data Release and Scientific Exploitation of the J-PLUS Survey:** The goal of the event was to present the survey to the Spanish community, describe the potential and quality of the data, and discuss scientific cases and applications.

July 22-29, 2017 **SDSS-IV Collaboration Meeting Santiago 2017:** The Sloan community meeting. The talks in the conference covered topics in galactic, extragalactic, cosmology and technical aspects of the infrastructure of the Sloan Digital Sky Survey.

Sept. 12 - 16, 2016 **11th Heidelberg Summer School on the topic of Astrostatistics & Data Mining:** The school looked at the principles of inference and methods of astronomical data analysis and data mining, also covering a range of numerical and statistical techniques and their application to different types of astronomical data.

Mar. 15 - 17, 2016 **Conference on Big Data from Space - BiDS'16:** The objective of this conference is to bring together researchers, engineers and users working in the area of Big Data from Space.

Aug. 18-21, 2014 **ALMA and the Brazilian community workshop:** The goal of the workshop was to explore how the current science activity within the Brazilian community can benefit from the new ALMA observatory and millimetre/submm observations in general.

Sept. 02 - 12, 2014 **JPL-Caltech Virtual Summer School in Big Data Analytics:** Computational skills and methodology needed for the analysis and interpretation of ever more massive and complex datasets are essential for the scientific and technological workforce in the 21st century. This virtual summer school addressed this need.

Out. 18 - 19, 2014 **VIII workshop in neuroscience:** the workshop covered the themes memory, consciousness, neurotoxicity, neuro degeneracy and graduate programs in neuroscience. Bento Gonçalves, RS - Brasil. (UFRGS)

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Out. 28 - 29, 2014 **III symposium of the UFRGS psychiatry league: controversial issue on neuroscience.** In the symposium, the following themes were discussed: neuroimaging, drug regulation, suiciding and medicalisation.

Sept. 16 - 20, 2013 **5th INPE advanced course:** An overview of cosmology in the era of massive telescopes: Theory, observation and simulations. The lectures were focused on the following topics: 1) Cosmic Microwave Background, with emphasis on the new results from Planck 2) the large-scale structure, as unveiled by the recently completed Sloan Digital Sky Survey and 3) cosmological simulations, which became an essential part of the research in this field.

Communication Skills

2017 Plenary talk at SDSS-IV Collaboration Meeting Santiago, presentation link

2017 Imparted a workshop in LaTeX collaborative tools as overleaf and sharelatex and publications management with Mendeley at Instituto de Astrofísica de Canarias.

2017 Imparted a workshop in version control using git, GitHub, atom and Gitkraken at Instituto de Astrofísica de Canarias.

2016 Oral presentation at Día de Nuestra Ciencia

2014 Oral Presentation at ALMA and the Brazilian Community Workshop, at Rio de Janeiro, RJ - Brazil (ON).

2013 Poster at Latin American Regional IAU Meeting, at Florianopolis, RS - Brazil

2010 – 2013 Oral and poster presentation at the annual scientific initiation meeting, at Porto Alegre, RS - Brazil (UFRGS)

Computer skills

Advanced Python (numpy, scikit-learn, matplotlib, pandas, astropy, h5py, ipyvolume, pandas, Jupyter-notebook, Spyder...), VIM, DS9, aladin, shell script, Linux, MOOG, LaTeX.

Intermediate IRAF, TopCat, Git, Github, Computer Hardware and Support, Microsoft office, OpenOffice, SQL

Basic TensorFlow, C, FORTRAN, IDL, Scilab, R, HTML, JavaScript

Experience

Vocational

2017 **Observations at the INT**, La Palma.
10 nights performing spectroscopic observations at the Isaac Newton Telescope.

Details:
- Spectroscopic observations of stars (extreme metal poor candidates). The 10 nights were divided in two runs of 5 nights each.

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2015 **Observations at the NOT**, La Palma.
6 nights making spectroscopic observations at the Nordic Optical Telescope.

Details:
- Spectroscopic observations of star in open clusters.

2011–2013 **Intern**, Astrophysics laboratory, UFRGS.
Studying open Clusters

Details:
- Measuring star formation rate in solar neighborhood
- SOAR photometry in clusters within the bridge between Magellanic clouds
- Creating a pipeline to perform photometry in VVV (VISTA Variables in The Via Lactea) tiles

2010–2011 **Intern**, Magnetism laboratory, UFRGS.
Developing experiments in nanotechnology related with giant magnetoresistance.

Details:
- Making nanotips by electrolysis
- Using sputtering to make multilayer nanofilms
- Building experimental apparatus

Miscellaneous

2010–2013 **Teaching**.
- Private tutor:
  - Spanish
  - Physics
  - Math
- Euroschool – Informatics
- Wizard – Spanish

Languages

Portuguese **Native language**
Spanish **Advanced** *Fluent*
English **Advanced** *Fluent*

Reference people

Allende Prieto, Carlos **callende@iac.es**.

Sanchez Almeida, Jorge **jos@iac.es**.

Bonatto, Charles José **charles.bonatto@ufrgs.br**.

Research interests

General topics **Artificil inteligence, neuroscience, machine learning, lenguage acquisition, neuroimaging, consciousness teory**.

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Rafael Garcia-Dias

Post-doctoral application for King's College London

Previous and present research

Undergrad. During my physics undergraduate course I was primarily interested in the disciplines of astrophysics and computer programming applied to physics. As an undergraduate

VVV Photometry Open clusters student, I have worked as intern creating a pipeline to perform photometry in the data from the Vista Variables in the Via Lactea (VVV, Minniti et al. 2010) survey. At that point, there was no public photometric catalogue for the survey. I wrote the pipeline in IRAF (Tody 1986) script, and the data was used in the PhD theses of Eliade Lima. The theses can be found at www.lume.ufrgs.br/handle/10183/88499. Yet as an undergraduate I participate in the study of open clusters at the Magellanic clouds' bridge (Bica et al. 2015). Where I was responsible for making the data reduction, write part of the article and prepare the images of the clusters in the article.

Master Spectroscopy Open clusters During my master I worked with spectroscopy to hundreds of stars in dozens of open clusters. This work contributed to developing my programming skills, my understanding of the complexity of internal process in the Galaxy, and also gave me lots of experience in the problems of working with inhomogeneous data. In this period I also learned many statistical techniques such as uncertainty propagation, parametric and nonparametric hypothesis test, and a basic knowledge of the language R. Working with this kind of tools also increased my interest in data visualisation tools, what drove my interest in the programming language Python.

Machine learning APOGEE In my PhD I'm exploring machine learning techniques applied to APOGEE (Majewski et al. 2017), a high-resolution spectroscopy survey in the infra-red. My first paper has focused on the classification of the APOGEE spectra using K-means. The first part of the work was dedicated to writing the K-means code in Python, apply the code to APOGEE data, and interpret the classes automatically generate by K-means, see Garcia-Dias et al. (2018). The paper is not only a mere application of K-means, but it is also an overview of the dataset and a guide for K-means application and validation.

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Codding skills During my PhD theses I also focused on developing consistent programming skills. Not only to produce very complex codes but also to make readable, maintainable, reusable and efficient software. The massive amount of data available through the large surveys demands the simultaneous involvement of many people and the best usage of the computational resources. Must of the science done with it is done through code. I believe its time to astrophysicists to start to code more professionally. With this in mind, I have imparted some tutorials at the Instituto de Astrofísica de Canarias teaching how to do version control and other basic skills in modern codding.

Galactic archaeology In the second phase of my PhD we are interested in expanding the thesis to other machine learning models. The focus is to establish a corpus of knowledge in how these algorithms can be applied to the surveys to perform chemical tagging and unveil fundamental aspects of the Galactic evolution. Through my whole career, I was interested in understanding the galaxy formation and evolution. I started doing simulations to estimate the rates of dissolution of open clusters. I learned how to reduce photometric data and how to use it to derive open cluster's ages and physical properties. I learned spectroscopy, searching for a deeper understanding of star clusters. Then I was able to contribute to the Open Clusters Chemical Abundances from Spanish Observatories (OCCASO), a spectroscopic survey of open clusters (Casamiquela et al. 2017). All my previous works were devoted to study clusters which are the building blocks of the galaxy. Now I'm moving to a more global view in order to make the best from the latest massive spectroscopy surveys.

References

Bica, E., Santiago, B., Bonatto, C., et al. 2015, MNRAS, 453, 3190

Casamiquela, L., Carrera, R., Blanco-Cuaresma, S., et al. 2017, MNRAS, 470, 4363

Garcia-Dias, R., Allende Prieto, C., Sánchez Almeida, J., & Ordovás-Pascual, I. 2018, ArXiv e-prints [[arXiv]1801.07912]

Majewski, S. R., Schiavon, R. P., Frinchaboy, P. M., et al. 2017, AJ, 154, 94

Minniti, D., Lucas, P. W., Emerson, J. P., et al. 2010, New A, 15, 433

Tody, D. 1986, in Proc. SPIE, Vol. 627, Instrumentation in astronomy VI, ed. D. L. Crawford, 733

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