Analysing observations applying complex modelling and Bayesian inference

Leen Decin
Institute for Astronomy
KU Leuven, Belgium
leen.decin@kuleuven.be

Paul Palmer
School of GeoSciences
University of Edinburgh, UK
paul.palmer@ed.ac.uk

The Project

Innovative observational insight often requires intelligent data analysis techniques in combination with multi-wavelength observing strategies. To observe and constrain the different processes occurring in exoplanets, we need predictions of indirect observables from detailed models. A grid of models will be developed by the larger CHAMELEON consortium, be analysed by classical statistical methods to reveal robust trends and parameter-dependencies, and serve as training sets for neural networks and new machine learning techniques. The objective of this project is to apply complex modelling concepts and Bayesian analysis techniques to the analysis of existing data of exoplanets and, when available, E-ELT and JWST-ERS MIRI data. The ultimate goal is to retrieve the dynamical and chemical composition of the studied objects and evaluate the performance of the various retrieval techniques.

Innovative Training Network (ITN) - CHAMELEON

This project is part of the Marie Sklodowska-Curie Innovative Training Network (ITN) **CHAMELEON** "Virtual Laboratories for Exoplanets and Planet Forming Disks" (http://chameleon.wp.st-andrews.ac.uk). The ITN combines the expertise of eight European research institutes (Universities of St. Andrews, Groningen, Copenhagen, Edinburgh, Leuven and Antwerp, the Max-Planck Institute in Heidelberg and the Netherlands Institute for Space Research) to cover all relevant aspects for this complex modelling task, joining the expertise in planetary atmospheres and protoplanetary disks, including observation and interpretation. The network will consist of 15 Early Stage Researchers (PhD students) and the respective supervisors/local research groups. For a complete list of all open PhD positions within this training network please visit http://chameleon.wp.st-andrews.ac.uk/ .

The Host Institutes

The Institute of Astronomy of KU Leuven in Belgium is a vibrant research group of some 70 scientists, engineers, and administrative staff (fys.kuleuven.be/ster), including 6 full-time and 3 part-time professors. The institute is an expertise centre in stellar physics and active in several international consortia and collaborations, involving telescopes at observatories worldwide and in space. The IoA is responsible for the organisation of the 2-year Master in Astronomy & Astrophysics at the Faculty of Science and operates the 1.2m Mercator telescope at La Palma Observatory, Canary Islands.

The School of GeoSciences at the University of Edinburgh is a founding member of the Centre for Exoplanet Science at the University of Edinburgh with the School of GeoSciences Physics. It was established in recognition of the emerging interdisciplinary nature of exoplanet science. The Edinburgh centre is currently focused on computational modelling of atmospheres and planetary disks, direct-imaging and characterisation of exoplanets and brown dwarfs, data retrieval methods, extreme conditions, and astrobiology. It includes six members of staff and a vibrant group of PhD students and postdoctoral researchers.

The Position

The selected PhD students will be offered a 2+2-year dual-joint contract, with training secondment (12

months) for this position foreseen at the University of Edinburgh, with additional short trainings at SRON and the University of Groningen (each one week). The salary will be commensurate to the standard scale for PhD students in Belgium; it includes social and medical insurance as well as pension rights. The successful PhD applicants will have to register at, and comply with, the regulations of the Arenberg Doctoral School of the KU Leuven and the University of Edinburgh. The successful PhD applicants will follow a doctoral programme including personal training in management, science communication, and teaching.

We seek an excellent student with a strong background in physical sciences, chemistry, mathematics and/or astrophysics. A successful candidate must hold a Masters degree or equivalent by the starting date of the position. Previous research experience on planet forming disks, astrochemistry, and/or mid-IR spectroscopy and a track record of team work/mobility will be important criteria for the selection. Note that the general eligibility and mobility rules of Marie Sklodowka-Curie Actions apply, i.e. applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of the recruiting partner for more than 12 months in the 3 years immediately before the recruitment date.

Instructions to apply

The application package should be sent **as one single PDF** containing

- (i) a curriculum vitae, with a publication list if relevant;
- (ii) a statement of interest (max. one page, including a brief description of research interests and relevant experience);
- (iii) copies of university grades, certificates and/or diplomas;
- (iv) two letters of reference to be sent by the application deadline (references are welcome to send their letters directly to clio.gielen@kuleuven.be);
- (v) a statement that confirms that you understood the requirements of the joint degree and the Marie Sklodowska-Curie mobility criteria as outlined on https://chameleon.wp.st-andrews.ac.uk/recruitment/.

The application material should be sent as one PDF by e-mail to Clio.Gielen@kuleuven.be with subject "PhD-CHAMELEON_ESR4-applicantname" by February 3rd 2020 (or until the positions are filled).

Applications that do not strictly follow these guidelines will not be considered.