ESR12 Connecting the atmosphere and the interior in extrasolar gas planets

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Project Description

The goal of this project is to connect the interior of exoplanets with observations of the atmosphere (i.e. spectra, colours etc), and compare results from 1D and 3D computations. The most well observed exoplanets today are hot jupiters so close to their host star that they most likely are tidally locked. In Leuven the student will gain experience in using 3D global circulation models (GCM) and apply them to tidally locked worlds with permanent cloudy night sides, comparing 3D atmospheric cooling rates with 1D interior model cooling rates, and study the wind jets in the 3D atmosphere (Carone et al. 2019 arXiv:1904.13334) and their role in inflating close-in planets (i.e. solving the hot jupiter radius anomaly). In Copenhagen the student will use the MARCS 1D stellar atmospheres code (Gustafsson et al 2008, A&A 486, 951), which has been thoroughly tested against observations for temperatures down to the coolest stars, and participate in developing it further for exoplanets and compare the results with the results from detailed 3D models.

Innovative Training Network (ITN)

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 and local research groups. A description of all the 15 announced PhD fellowships of the network is listed at (http://chameleon.wp.st-andrews.ac.uk/recruitment/).

The Host Institutes

In Copenhagen, the student will be part of the active environment in the Niels Bohr Institute's section for Astrophysics and Planetary Science, which covers aspects of exoplanet research, proto-planetary disk formation, formation of our solar system, meteorites and exploration of Mars. In Belgium, the student will be part of the University of Leuven's Institute of Astronomy, which is a vibrant research group of some 70 scientists, engineers and administration 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 position

The selected PhD student for this project will be offered a fully funded 3 years PhD study,

expected to start with 1 year at the University of Leuven under the supervision of Leen Decin and Ludmila Carone, followed by 2 years of training at the University of Copenhagen under the supervision of Uffe Gråe Jørgensen. The funding will be commensurate to the standard scale for PhD students in according to the Marie-Curie funding rules. The successful PhD applicant for this position will have to register at, and comply with the regulations of, the University of Copenhagen and the University of Leuven, and will obtain a double degree from the two universities. The successful PhD applicants will follow a doctoral programme including personal training in management, science communication, and teaching.

Requirements

We seek an excellent student with a strong background in physics or astrophysics. Successful candidates must hold a Masters degree or equivalent by the starting date of the position. Previous research experience on aspects of exoplanet- or stellar-atmospheres, analysis of astronomical spectra, experience with GCM or other advanced 3D atmospheric modelling, and a track record of team work/mobility will be important criteria for the selection, as will experience in computational coding (including Fortran). Note that the general eligibility and mobility rules of Marie Sklodowka-Curie Actions apply, e.g. that applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of the main host institution (in this case Denmark) for more than 12 months during the 3 years immediately before the recruitment date.

Application documents

Your application package should contain (i) a CV including publication list if applicable, (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, (v) a statement that confirms that you understood the requirements of the joint degree and the Marie Sklodowska-Curie mobility criteria as outlined at https://chameleon.wp.st-andrews.ac.uk/recruitment/.
Use the portal of the Niels Bohr Institute (https://www.nbi.ku.dk and follow the links under vacancies) at the University of Copenhagen to upload your application documents.

Application deadline: 3rd of February 2020. Applications potentially arriving after this date will be considered until the position is filled. The foreseen start is during September 2020 or soon thereafter.