Interferometry of Massive stars
Probing their complex environment at the milli-arcsecond scale with the VLTI & CHARA

Stage Master 2

Catégories

Physique et chimie des milieux interstellaires et circumstellaires
Formation, structure et évolution des étoiles

Description

Being affected throughout their lifetime by a strong mass-loss due to radiative winds, fast rotation, and a high binarity rate, massive stars pose several challenges to the understanding of their observational properties and evolution. Among all available observing techniques, long-baseline optical interferometry is the only one providing the milli-arcsecond (mas) angular resolution needed to resolve stellar surfaces and close-by environments, allowing for instance to directly probe departure from spherical symmetry induced by fast-rotation or binarity.

The Lagrange laboratory of the Observatoire de la Côte d'Azur is a leading institute in the development and scientific exploitation of interferometric beam-combiners. For more than twenty years, we have been building state of the art instruments for the world major interferometric arrays: The Center for High Angular Resolution Array (CHARA) in the USA, and the European Very Large Telescope Interferometer (VLTI) built in the Atacama Desert in Chile. Among these instruments are: AMBER, the first K-band instrument at VLTI, and until now the most productive interferometric beam-combiner ever built; MATISSE, the new mid-infrared VLTI spectro-interferometric imager operating since 2018; VEGA the first visible instrument at CHARA and SPICA its upcoming successor that will be installed next year on CHARA.

Thanks to these instrumental developments, our team in Nice have accumulated a huge amount of data on various massive stars ranging classical Be stars, i.e., close to main-sequence extreme rotators surrounded by gaseous environments to more evolved objects such as supergiants stars showing strong radiative winds or more complex dusty and gaseous disk-like environment such as B[e] supergiants.

The intern will participate in the analysis of some of the data from the VEGA, AMBER and MATISSE instruments as well as the preparation of the scientific programs of the SPICA instrument. Depending on the intern skills and interests various modelling techniques can be used: model-fitting with chromatic geometrical and kinematic models, radiative transfer, and image reconstruction with an aim of publishing some of the results by mid-2022 in a refereed journal. The intern will work in a team of experts in the field of interferometry, physics of hot stars, and radiative transfer. The work could continue in a phD founded by our newly granted ANR project MASSIF (Massive Stars in Interferometry).

Plus d'informations

http://www.anr-massif.fr

Nature du travail demandé

Simulations numériques
Traitement de données
Modélisation

Pré-requis

Python programming - Basics of stellar interferometry - Basics of radiative transfer

Informations complémentaires

Université Côte d'Azur
Laboratoire Lagrange, Campus Valrose, UCA, Nice, France

Laboratoire

UMR-7293 Lagrange
Laboratoire J-L Lagrange
Observatoire de la Côte d'Azur, Bd de l'Observatoire CS 34229
06304 Nice cedex 4

Calendrier prévisionnel

Date initiale estimée : 2022-01-03
Durée proposée : 4 à 6 mois

Encadrant

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Gratification

En cours de négociation