INTERNSHIP PROPOSAL (+PhD)

Modeling magnetohydrodynamics instabilities in deep stellar layers

Laboratory name: Laboratoire J.A. Dieudonné (UMR CNRS 7351)
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Internship location: Parc Valrose, Université Côte d'Azur, Nice
Thesis possibility after internship: YES
Funding: YES (M2+PhD) If YES, which type of funding: ERC

- Required background in physics or applied mathematics
- Experience with coding, numerical methods, nonlinear physics or fluid mechanics

M2 internship and PhD funding in astrophysical fluid mechanics is offered at LJAD as part of the European CIRCE project, in collaboration with Observatoire de la Côte d'Azur.

The project will focus on the numerical modeling of nonlinear magnetohydrodynamic instabilities giving rise to magnetism in the radiative layers of solar-type stars. Understanding subcritical dynamo instability in these layers is instrumental for stellar evolution models, particularly stellar rotation dynamics. It is also a key element for tracing the history of the Sun. Currently available theoretical predictions are largely incompatible with observational data recently obtained through NASA's Kepler space mission. An aspect of the project will also focus on characterizing the observable consequences, and more specifically the signature of magnetic fields on asteroseismic signals, in particular for stars analogous to the Sun. This work will thus be part of the exploitation of the European space mission PLATO (ESA) in which the Observatoire de la Côte d'Azur is involved.

Ref: Petitdemange, Marcotte & Gissinger, Science 2023
Mannix, Ponty & Marcotte, Physical Review Letters 2022

The successful candidate will be affiliated with the Fluid Mechanics team of the J.A. Dieudonné Laboratory, located on the Valrose campus of Université Côte d'Azur, and with the Stellar and Solar Physics team of the Lagrange Laboratory, at Observatoire de la Côte d'Azur. He or she will benefit from an interdisciplinary environment closely combining fluid mechanics, astrophysics and applied maths, as well as numerous opportunities to participate in conferences or summer schools.

Parc Valrose, Université Côte d'Azur

Observatoire de la Côte d'Azur