



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

DIPARTIMENTO DI FISICA E ASTRONOMIA
Department of Physics and Astronomy - DIFA

PhD project in ASTROPHYSICS

Title of the Project: The imprint of the initial conditions on planet formation

Supervisor : Prof. Leonardo Testi

Scientific Case:

In the last decades have witnessed the discovery and characterization of the diversity of exoplanetary systems. Exosystems show a broad variety of planetary architectures, and it is yet very unclear how common are planetary systems with characteristics similar to our own Solar System. One of the most fascinating goals of modern astrophysics is thus to understand the genesis of our Solar System in the broader context of planet formation. The ECOGAL collaboration combines the modeling and observational efforts of four main research institutes across Europe to address this problem. ECOGAL researchers are engaged in a multi faceted approach aimed at understanding the different conditions for planet formation throughout the Galaxy. The ECOGAL approach is based on the detailed comparison between numerical simulation and observations from the full Galaxy scale to that of individual planet forming disks. The approach is designed to allow us to trace properties of newly forming stars and planetary systems to the characteristics of the environment where they originate. The University of Bologna contribution focuses primarily on constraining observationally the chemical and physical conditions and evolution of molecular cores, disks and the young planets forming within them.

Outline of the Project:

The student will focus on the understanding of the chemical and physical properties of clumps and cores and the disks forming within them. With the goal of tracing the chemical and physical processes that shape the initial conditions for planet formation. A combination of infrared, millimetre and radio data coming from the world leading observatories (JWST, ESO, ALMA, and the VLA) will be used for the research project. Depending on the inclination of the student and evolution of the project during the PhD, the work may include the planning, analysis and interpretation of observational data, the detailed comparison between data and numerical models, using the post-processing and machine learning tools developed by the ECOGAL collaboration, or the development of population synthesis models to understand the distribution of the observed properties in the context of the diversity of the initial conditions for planet formation.

The project comes with the funding and resources to execute the research. The student will be expected to actively collaborate within the international ECOGAL team, including exchange visits to and from the partner institutes.

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