



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: Constraining the physics of planet formation with ALMA and NOEMA

Supervisor : Leonardo Testi

Co-Supervisors : Veronica Roccatagliata

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, also constraining the diversity of their demographical properties.

Outline of the Project: The student will focus on the understanding of the properties and evolution of young stars, gas, solids and planetary bodies within planet hosting disks, attempting to trace the effects induced by the formation of planets within the disks and trying to constrain the link between physical and chemical properties of young solar analogs and planetary atmospheres. A combination of infrared, millimetre and radio data coming from the world leading observatories (ESO-VLT, ALMA, NOEMA and the VLA) will be used as part of this project, including data from the NOEMA ENYGMA Large Programme and the ALMA Band 2 guaranteed time programme, in particular in regards to the chemical and physical characterization of the properties of gas and solids in the planet forming regions of protoplanetary disks.

The project comes with 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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