

— Proposed China-CONICYT Postdoctoral Research Project —

From High Mass filaments to High Mass Stars

Amelia Stutz and HuaBai Li

1. Summary:

Project proposers: Profs. Amelia Stutz and HuaBai Li

Chilean collaborators: Prof. Dominik Schleicher, Prof. Rodrigo Reeves, Dr. HongLi Liu

Chinese collaborators: Prof. Zhijian Luo, Paul Law

Chilean Host Institution: Universidad de Concepcion

Chinese Host Institution: Chinese University of Hong Kong

Project duration: 3 years; 2 years in China or Chile, 1 year in remaining country.

Abstract:

How molecular clouds convert their gas mass into stellar mass is one of the most fundamental open questions in modern astrophysics. To date, physical conditions in nearby low mass clouds (e.g., Taurus- like) have been probed in great detail both observationally and theoretically. However, major open questions still remain as to the possibly very different physical drivers in the far more massive filamentary clouds where high mass stars and clusters form. The first requirement for assessing the physical state of massive filaments is estimating their mass profiles, from which the filament density profile and gravitational potential can be calculated. With this fundamental measurement the roles (energy densities) of turbulence and magnetic fields can be compared to gravity. This observational program leverages the ideal combination of expertise of the PIs with Chile's unique observational capabilities to establish the physical state of high line-mass filaments in the Galaxy. This will be accomplished via archival Herschel observations of the mass distributions, LCT and APEX and ALMA observations of the gas velocities (turbulence), and ALMA and LCT observations of magnetically induced polarization in high line-mass filaments. The University of Concepcion Astronomy faculty expertise in observational and theoretical star formation, the latter specifically in magnetic fields and astrochemistry, combined with the expertise in polarization observations and analysis in star forming regions at the Chinese University of Hong Kong, will provide the necessary and fruitful project conditions ideally suited for an ambitious postdoc. Our goal is to develop an empirical assessment of the physical state of the sites high mass star and cluster formation: high line-mass filaments.