ESF Short Exchange Visit Grant
Summary of the GAIA-ESO "Thin Disk Kinematics" Project
Report by Basmah Riaz

The purpose of my ESF short visit was to participate in the GAIA-ESO Spectroscopic (GES) project on "Thin Disk Kinematics", which is being conducted at INAF, Palermo, under the supervision of Drs. Micela and Prisinzano. This project is focused on a search for young stars in the solar neighborhood. This work involves analysis of VLT/GIRAFFE derived physical quantities of candidate young stars, which have been discarded from previous Galactic plane surveys of field star population. A distinction between young and old field stars can be made by measuring the lithium abundance and strength in the Hα and other accretion-associated emission lines. This work also includes an assessment of the possible membership of these targets in nearby young stellar associations or moving groups, based on their radial velocities and space motions.

My work related to this project was focused on the γ Velorum cluster, in particular, to search for samples of stars which can be rejected as candidate cluster members, and which are likely to be young field stars. During my two-week visit at INAF, I worked on compiling various datasets available for the γ Vel cluster. These datasets include measurements for the parameters of radial velocity, the Lithium and Hα equivalent widths, the effective temperature and surface gravity, the optical colors of (B-V) and (V-Ic), and the X-ray luminosity measurements. Using this compiled dataset, I then constructed various samples by applying different selection criteria, which would exclude as many cluster members as possible. The main selection cuts were applied on the radial velocity and surface gravity measurements, in order to select the off-cluster dwarf stars and exclude all giants, and then Li and Hα equivalent widths and X-ray luminosity criteria were applied to select the likely young field stars from within these samples. We have constructed three different samples now, totalling about 300 objects, which should mainly be representative of the off-cluster young field stars.

Our next plan is to further investigate the properties of these samples. We will conduct a detailed analysis of the spectra to confirm the radial velocity measurements, and to determine the extent of rotational broadening that could affect the Li and Hα line measurements. We will also be obtaining more data related to the accretion activity and X-ray luminosity, which will allow us to further reject the possible candidate cluster members. We also aim to collaborate with a modeling group on theoretical predictions of such young field star populations, and to determine how well the observed populations match with the predicted values. We plan to complete these projected tasks over a period of the next six months, leading to a publication thereafter.