## Large-Scale Distribution of X-ray Sources in Orion

Michael F. Sterzik, Juan M. Alcalá, Ralph Neuhäuser, and Richard H. Durisen

We discuss the spatial distribution of about 1400 coronally active young star candidates from the ROSAT All-Sky Survey (RASS) in an approximately 5000 deg$^2$ field centered on Orion. Three distinct populations of young stars, which we call the clustered, halo, and background populations, seem to be present in the RASS sample.

Roughly one third of the sources are concentrated in regions of recent or ongoing star formation (OB1a, $\lambda$-Ori, OB1c, OB1d and NGC1788) and correlate spatially with molecular clouds and with previously discovered concentrations of $H\alpha$ emission stars. Most of these clustered sources (60-70%) are likely to be weak-line T Tauri stars based on detection of strong Lithium absorption in optical spectra of a subsample. The clustered population is embedded in an extended halo population of about 600 RASS sources which crosses the field in a broad lane coincident with the Gould Belt in this area of the sky. Based on high-resolution optical spectroscopy of a subsample, we expect more than half of the halo population to be considerably younger than the Pleiades (70-100 Myrs). The halo population also represents a significant overabundance of X-ray active sources compared with standard, detailed galactic model predictions, further suggesting that most of these stars are associated with Gould's Belt. The rest of the RASS sources form a more or less homogeneous background ($< 0.1$ stars/deg$^2$). This population consists primarily of young and active field stars with typical ages of about 100 Myrs.

We review the possibility that isolated pre-main sequence stars may have been ejected from their birthplaces during their early evolution (so-called 'run-away' T Tauri stars) and present evidence of a few objects with exceptional properties, including stars with apparently inconsistent kinematic behavior (e.g., P1724) and late-type, pre-main sequence stars far from any star forming site (e.g., Gl182).

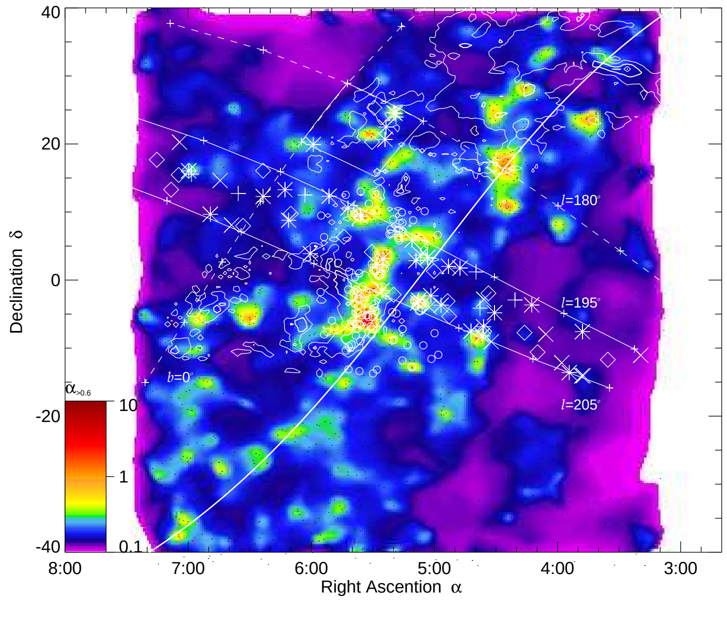


Figure 1: Large-scale spatial distribution of candidate young stars in Orion and Taurus-Auriga. The X-ray sources have been selected from the ROSAT All-Sky Survey. Their space density is color-coded, and contours of molecular clouds are overlayed. Positions of classified objects that have been followed up by optical spectroscopy are indicated (crosses: high-Lithium sources; x: low-Lithium sources; diamonds: no Lithium). The dashed line is the galactic plane. The shape of the Gould Belt midplane (thick line) coincides with regions of enhanced young star candidate density and with a greater density of high-Lithium stars south of the galactic plane (from Sterzik, Alcala, Neuhäuser & Durisen, Orion Workshop 1997).