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Kinematics of nearby disk stars from Hipparcos database

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Abstract. The HIPPARCOS catalogue (ESA 1997) provides the best database to characterize the local stellar kinematics and represents an important contribution to the understanding of the structure and evolution of the Milk Way.From a selected sample of about 22000 HIPPARCOS stars we investigated the possibilities to represent the probability distribution of peculiar velocities by a superposition of two Gaussians instead of using one Gaussian as traditionaly done.The stars considered here were grouped by spectral type and selected following the same criteria as used by Mignard (2000): only single stars, stars with distances from 0.1 to 2.0 Kpc, level of completeness greater than 70% based on Tycho catalogue (ESA 1997) as function of galactic latitude, magnitude and color, peculiar velocity smaller than 100 Km/s. In Mignard 2000 this limit is 60-90 Km/s depending on the spectral type.The celestial sphere was divided in 72 regions of equal surface in which we have modeled the data with two Schwarzschild velocity distributions (Schwarzschild 1907) whose parameters were determined by a least square adjustement.For early type stars the results are not significantly different from the classical treatment with only one Gaussian but for late type stars the distribution modeled by two Gaussians better represents the data. In this case we can clearly see the presence of two well defined kinematical populations: one population of high velocity dispersion stars ($\sigma_u \approx 40\mathrm{kms}^{-1}$) and another of low velocity dispersion stars ($\sigma_u \approx 20\mathrm{kms}^{-1}$) approximately the same as that the early type stars. This result shows that the two Gaussians method allows to take into account for late type stars, the spread of ages in each spectral type groups treated here.

ESA 1997, *The HIPPARCOS and Tycho catalogues*, ESA SP-1200.
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