SISTEMAS ESTELARES

Material didáctico para las clases de
"*Vía Láctea: cinemática local* "

Clases teóricas dictadas por:
Dra. Lilia P. Bassino

Componentes del movimiento solar (respecto al LSR cinem.)

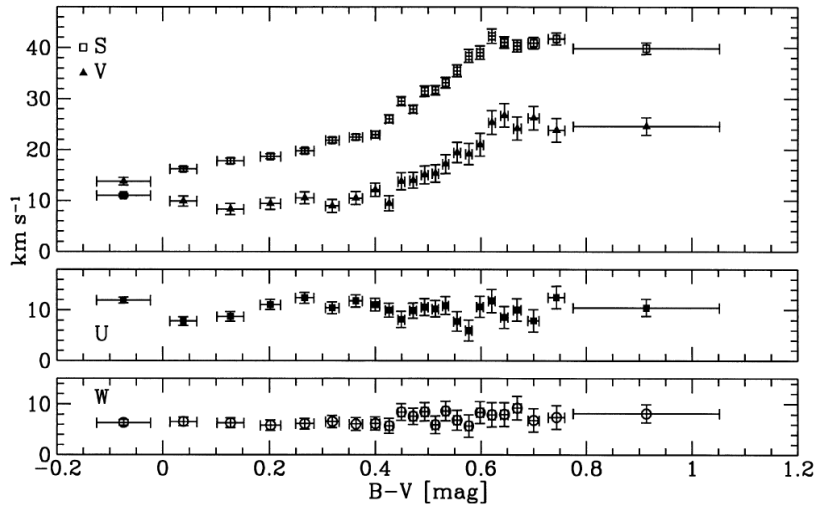


Figure 3. The components U, V and W of the solar motion with respect to stars with different colour $B-V$. Also shown is the variation of the dispersion S with colour.

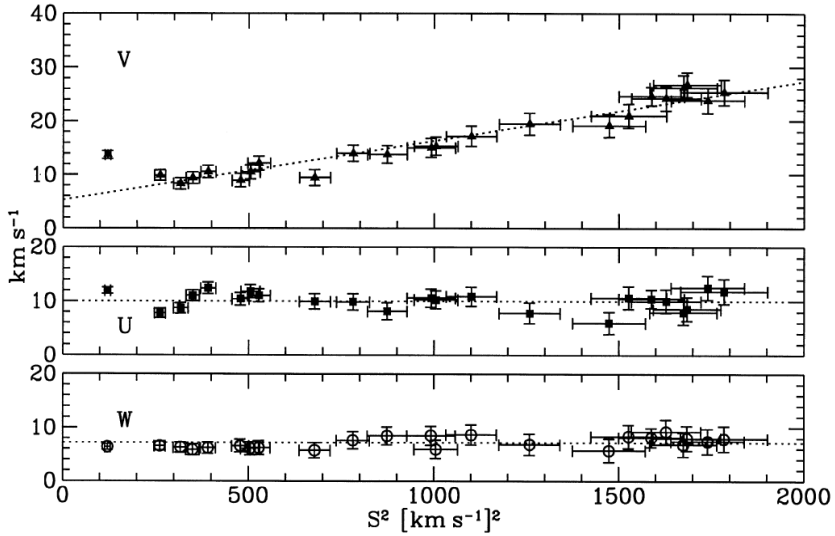


Figure 4. The dependence of U, V and W on S^2. The dotted lines correspond to the linear relation fitted (V) or the mean values (U and W) for stars bluer than $B-V=0$.

Dehnen & Binney 1998, MNRAS, 298, 387

Componentes del movimiento solar
(respecto al LSR dinámico)

Comparando la cinemática estelar local (veloc. heliocéntricas de estrellas F y G, *Hipparcos*)
con la distrib. de velocidades de un modelo químico-dinámico (Schönrich & Binney 2009, evol. discos delgado y grueso):

$(U, V, W)_\odot = (11.1 \pm 0.7\ ,\ 12.24 \pm 0.5,\ 7.25 \pm 0.4)$ km/s

$\boxed{\mathcal{V}_\odot = 18 \text{ km/s}}$

Schönrich et al. 2010, MNRAS, 403,1829

Componentes del movimiento solar
(respecto al LSR dinámico)

Comparando la cinemática estelar local (estrellas F y G) con la *distrib. de velocidades* de un modelo químico-dinámico, y logrando el mejor ajuste:

Schönrich et al. 2010

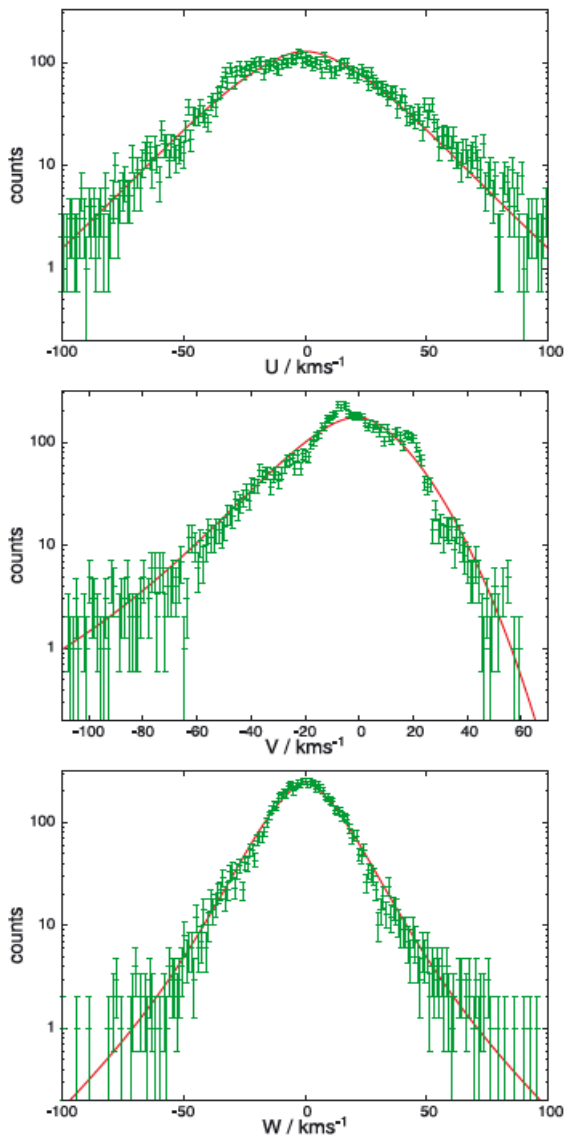
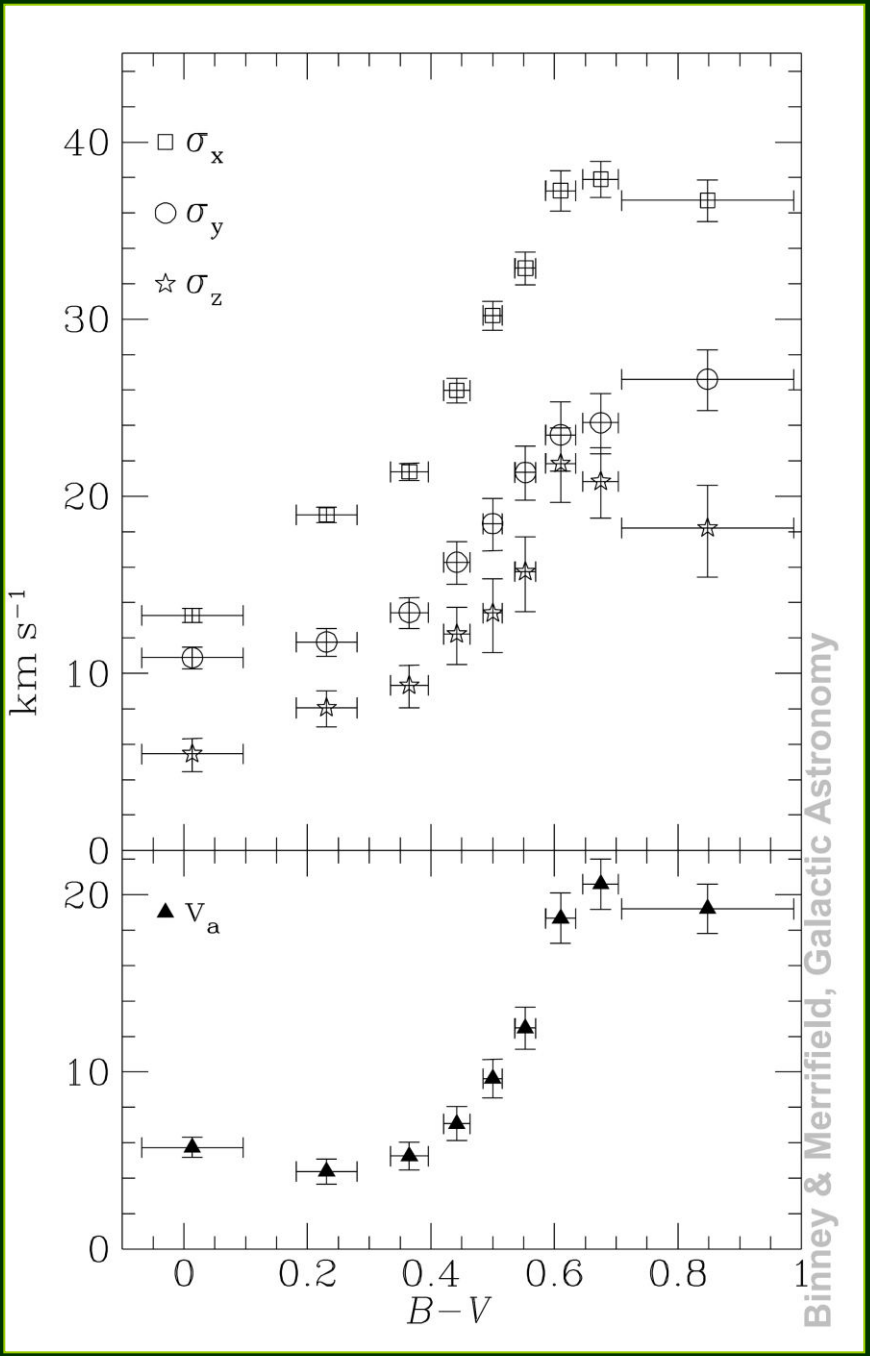


Figure 5. Curves: the model distributions predicted by the SB09a model in the U, V and W components of velocity (from top to bottom). Data points with Poisson error bars: the observed distributions of the GCS stars shifted by our estimate of $v_{\odot}$ to optimize the fit of the data.

Dispersión de velocidades en U, V, W - estrellas de Sec. Ppal.

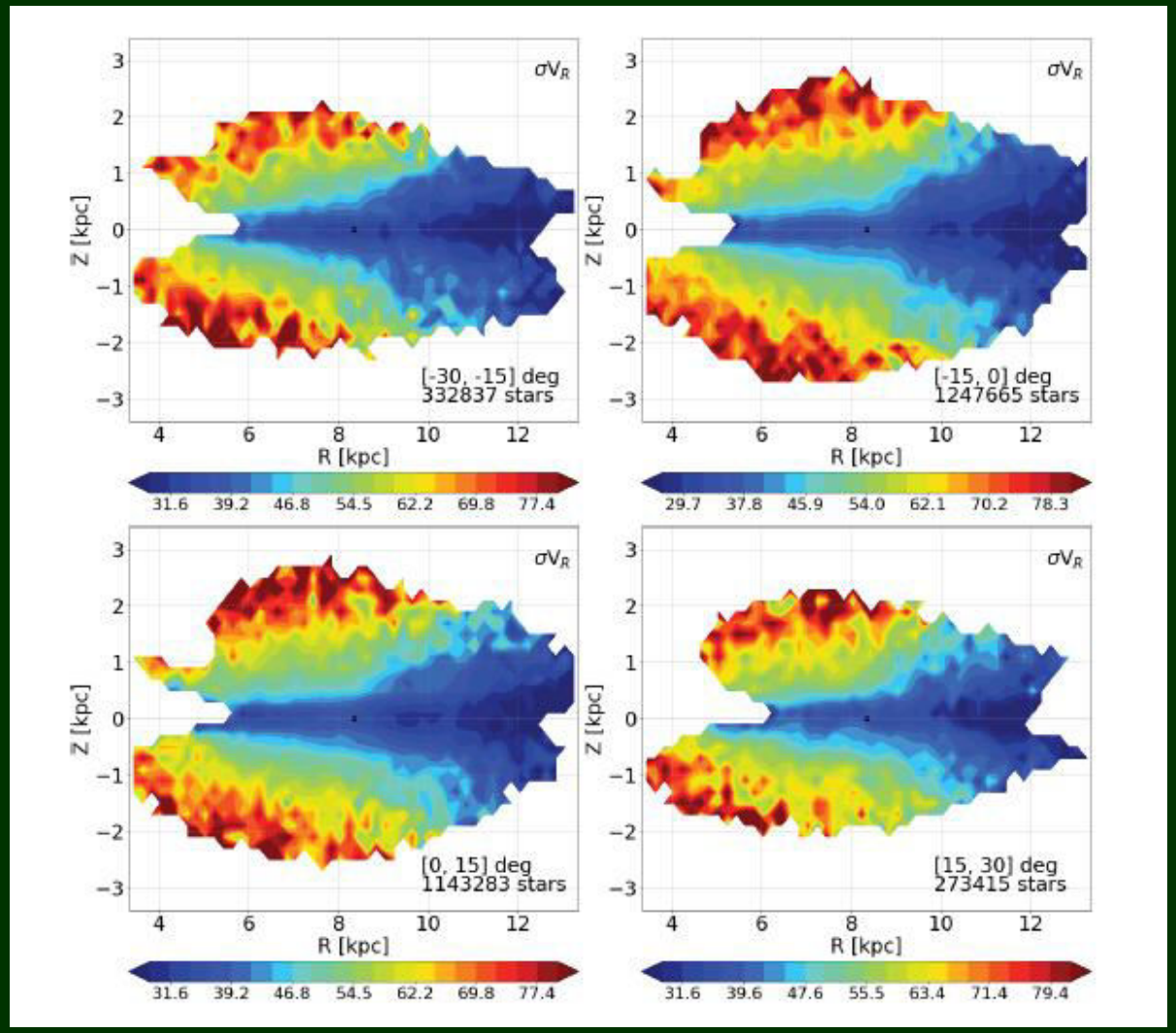


Asymmetric Drift:

$Va = V_{\odot}(\sigma) - V_{\odot}(\sigma=0)$

Binney & Merrifield, “Galactic Astronomy”

Mapas de dispersión en velocidad radial en el plano (R, Z) para distintos rangos de longitud galáctica



Gaia Collaboration 2018, A&A, 616, A11

Desviación del Vertex

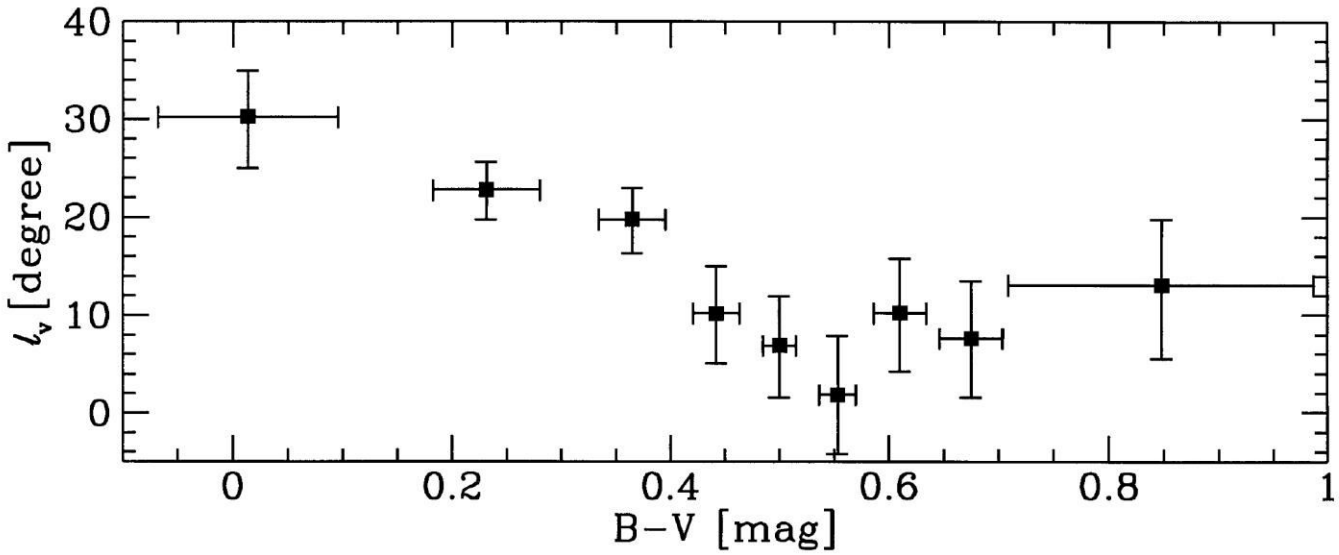


Figure 6. The vertex deviation ℓ_v versus $B-V$ colour.

Dehnen & Binney 1998, MNRAS, 298, 387

Distribución de velocidades de estrellas de Sec. Ppal. en los alrededores del Sol

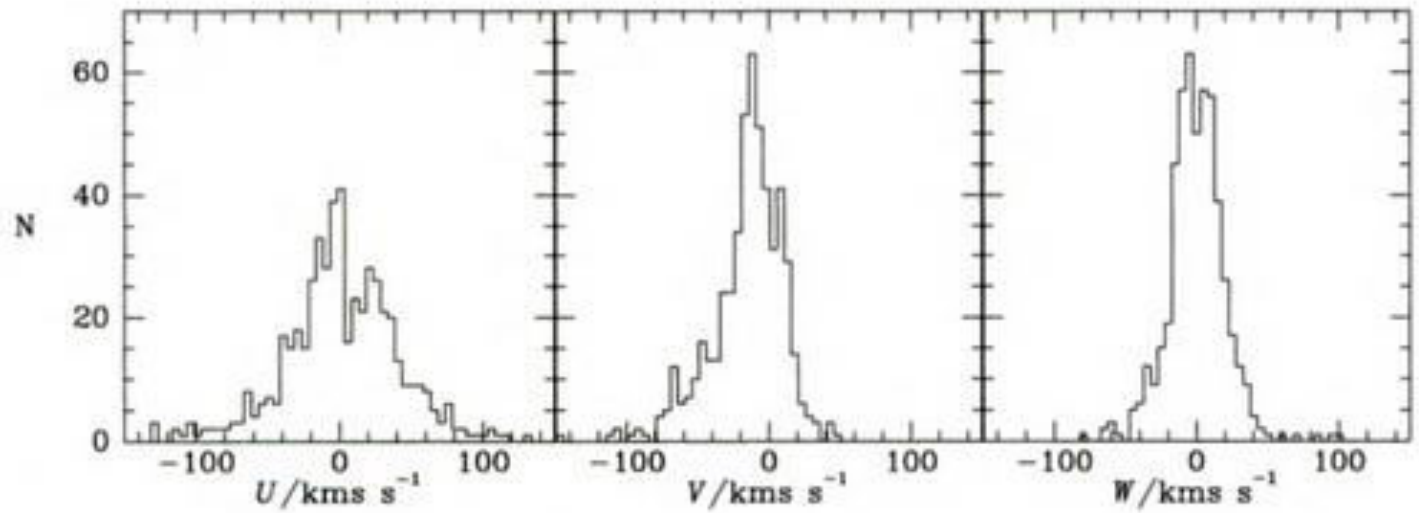
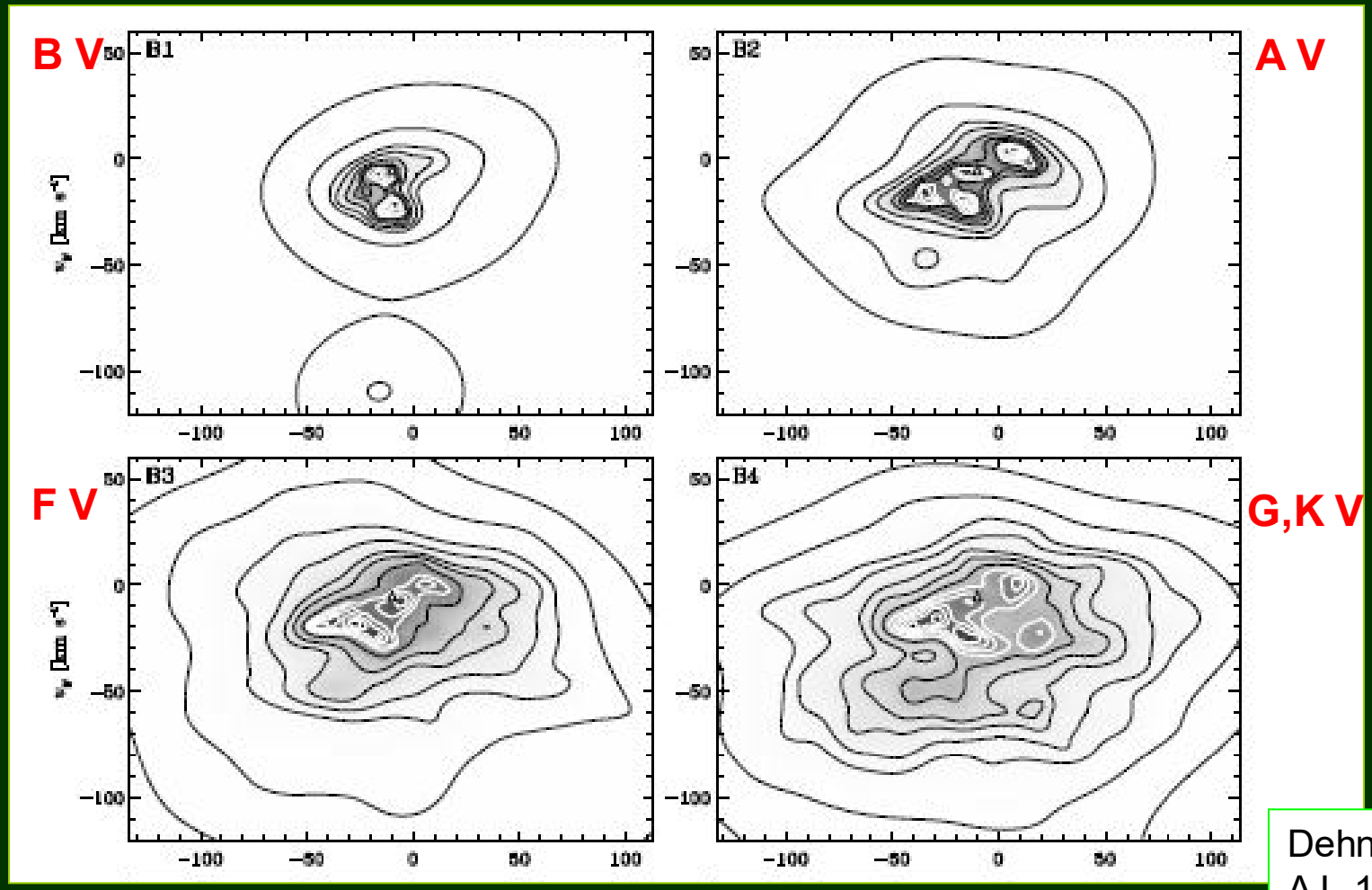


Figure 10.14 Upper panels: histograms of U, V and W for a sample of 323 nearby MS stars of MK type F1 and earlier. Lower panels: similar data for 510 K and M dwarfs. Velocities are with respect to the LSR that is defined by equations (10.11). [From data kindly supplied by H. Jahreiss]

Tipos espectrales K, M (enanas)

Binney & Merrifield, “Galactic Astronomy”

Densidad de estrellas en los alrededores del Sol, en el espacio de velocidades



Dehnen 1998
AJ, 115, 2384

V

U

FIG. 3.—Distributions in v_x (toward the Galactic center) and v_y (in direction of Galactic rotation): projection of $f(v)$ obtained as MPLE for the sets listed in Table 1. Gray scales are linear and the contours contain, from inside outward, 2, 6, 12, 21, 33, 50, 68, 80, 90, 95, 99, and 99.9 percent of all stars; i.e., half the stars are within the innermost dark contour. The origin is at the solar velocity, while the velocity derived for the LSR in Paper I is indicated by a triangle. Note that the smoothing is optimal for the full sample (AL) only, while the results for the subsets are undersmoothed. However, since the subsets are distinct, any feature common to more than one of them is likely to be real.

Densidad de estrellas en los alrededores del Sol, en el espacio de velocidades

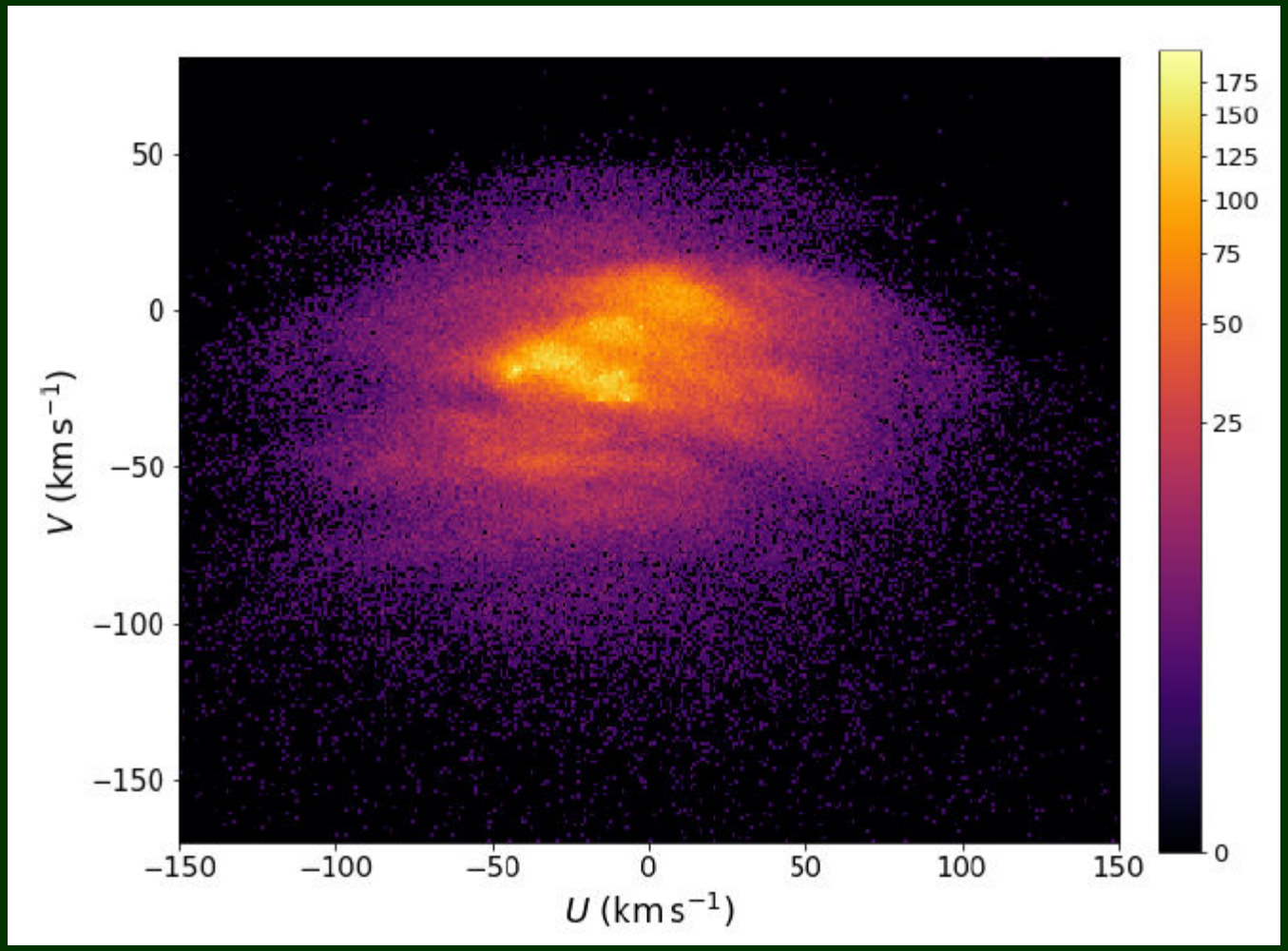


Fig. 22. Velocity plane of the stars in the solar neighbourhood. We show a 2D histogram of the velocity with a bin of 1 km s^{-1}, thus, the colour scale indicates the number of stars per (km s^{-1})^2.

Gaia Collaboration, 2018