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ESTIMATING THE MEAN INCLINATION OF ROTATIONAL AXES OF THE PLEIADES

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Stellar rotation has its origin in stellar formation, when the angular momentum of the parent cloud is transferred to the newer stars. The equatorial rotation V can be calculated from the radius and rotation periods by $V = 2\pi R/P$. The mean $\langle \sin i \rangle$, since i is the inclination angle between the stellar rotation axe and the line of sight, of a sample of observational data is estimated from the ratio between the mean of the projected velocity $\langle V \sin i \rangle$ and the mean of the equatorial rotation $\langle V \rangle$. In the literature, the mean inclination angle always adopts a value of $\pi/4$ independent of the particularities of the stellar population or the data sample under study. Such a procedure not infrequently leads to divergences between theoretical models and observed data. The present work intends to find out the real mean inclination angle for a set of stars in Pleiades cluster.

This work fits the distribution function of the true rotation of a sample of Pleiades stars with the generalized distribution function, named q -Maxwellian function. Also we determine the q value by fitting the projected rotational velocity distribution of those stars. Finally the q values obtained from the fitting procedures are used to estimate the mean $\langle \sin i \rangle$ for such Pleiades sample producing a good result when compared to mean values from the observational data.

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ON THE LOCAL DARK MATTER DENSITY

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Moni Bidin et al. (2012, ApJ, 751, 30, hereafter MB12) has recently proposed a new formulation to calculate the dynamical mass density enclosed in a large volume of the Galaxy, by means of the

three-dimensional kinematics of a test stellar population. Applying this formulation to three kinematical data sets available in the literature, they surprisingly found a lack of dark matter at the Solar position. Bovy & Tremaine (2012, ApJ, 756, 89, hereafter BT12) argued that MB12 calculation is flawed by a wrong assumption, and that a corrected one-dimensional formulation recovers the expected amount of dark matter. In this contribution, we show that BT12 formulation is based on an assumption ruled out by all observational evidence, that causes a strong overestimate of the mass density. Moreover, we show that the MB12 assumption criticized by BT12 has negligible effects on the results, hence their criticisms is not the solution to the puzzling results found by MB12.

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SUPERNOVA REMNANTS COLLIDING WITH MOLECULAR CLOUDS: FROM HIGH- TO LOW-ENERGY INTERACTIONS

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It is now well established that a class of gamma-ray sources in the galactic plane, especially in the TeV range as seen by HESS and other Cerenkov telescopes, and in the GeV range by the Fermi and AGILE satellites, is associated with intermediate-age supernova remnants interacting with molecular clouds in massive star-forming regions. After a brief general introduction linking high-energy gamma-rays and cosmic rays, I will focus on a few such gamma-ray sources (W28, W44, and W51) and the challenging conclusions that can be drawn from them. I will then describe our recent work on related submm measurements and implications of enhanced ionizing effects in molecular clouds due to locally accelerated low-energy cosmic rays.

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