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The Information Of The Milky Way From 2MASS Whole Sky Star Count: The Structure Parameters

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The Ks band differential star count of the Two Micron All Sky Survey (2MASS) is used to derive the global structure parameters of the smooth components of the Milky Way. To avoid complication introduced by other fine structures and significant extinction near and at the Galactic plane, we only consider Galactic latitude |b| > 30 degree data. The star count data is fitted with a threecomponent model: double exponential thin disk and thick disk, and a power law decay oblate halo. Using maximum likelihood the best-fit local density of thin disk is $n0 = 0.030 +- 0.002$ stars/pc^3. The best-fit scale-height and length of the thin disk are $Hz1 = 360+-10$ pc and $Hr1 = 3.7+-1.0$ kpc, and those of the thick disk are and $Hz2 = 1020+-30$ pc and $Hr2 = 5.0+-1.0$ kpc, the local thick-to-thin disk density ratio is $f2 = 7+-1\%$. The best-fit axis ratio, power law index and local density ratio of the oblate halo are $kappa = 0.55+-0.15$, $p = 2.6+-0.6$ and $fh = 0.20+-0:10\%$, respectively. Moreover, we find some degeneracy among the key parameters (e.g. n0,Hz1, f2 and Hz2). Any pair of these parameters are anticorrelated to each other. The 2MASS data can be well-fitted by several possible combinations of parameters. This is probably the reason that there is a wide range of values for the structure parameters in literature similar to this study. Since only medium and high Galactic latitude data are analyzed, the fitting is very insensitive to the scale-lengths of the disks.

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