SEEN AND UNSEEN MATTER IN THE GALACTIC DISC

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ABSTRACT. We use a Galaxy model including three components for the 'seen' stellar matter (Robin, Crézé, 1985). A scenario of star formation and evolution in the disc constrains the age distribution within each spectral type and luminosity range. The model fits available star counts. We add the 'seen' interstellar matter with local density 0.04 $M_\odot$ pc^{-3} and scale height 140 pc. Thus the total observed local density is 0.085 $M_\odot$ pc^{-3}.

We add ingredients (corona + bulge) to fit a typical flat rotation curve (Caldwell, Ostriker, 1981). We get a minimum variance with a corona characterized by central density 0.0794 $M_\odot pc^{-3}$ and core radius 3.147 kpc, and a bulge mass of 0.129 10^{11} $M_\odot$.

We compute a series of potentials through numerical integration of Poisson equation based on above density laws plus arbitrary Unseen Mass Discs (UMD) with density in the range 0 to 0.25 locally and scale heights from 250 to 3000pc.

We derive model density distribution through the Boltzman equation for a sum of isothermal components. Our Galaxy model provides directly the age distribution for any spectral type selection and then associates a velocity dispersion with each age. We compare computed and observed $\rho(z)/\rho(0)$ for F5-F8 stars (Hill, Hilditch and Barnes, 1979) and for K giants (Oort's and Upgren's densities rescaled by Bahcall (1984)). The age-velocity distribution mixture in spectral type limited samples directly follows from our galaxy model. So we can fit observed density data up to distances as large as lkpc from the plane just playing with the UMD.

CONCLUSION. An Unseen Mass Disc cannot be avoided. No acceptable fit can be obtain with UMD local density smaller than 0.15 $M_\odot$ pc^{-3}. The scale height should be larger than 1000pc. Smaller scale heights can be accepted with larger local densities.

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