The Local Dark Matter Density

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(1) Grand rotation curve of the Galaxy (MW), covering the entire disk and Local Group (R=0.1kpc to ~1 Mpc), was constructed as in Figures.

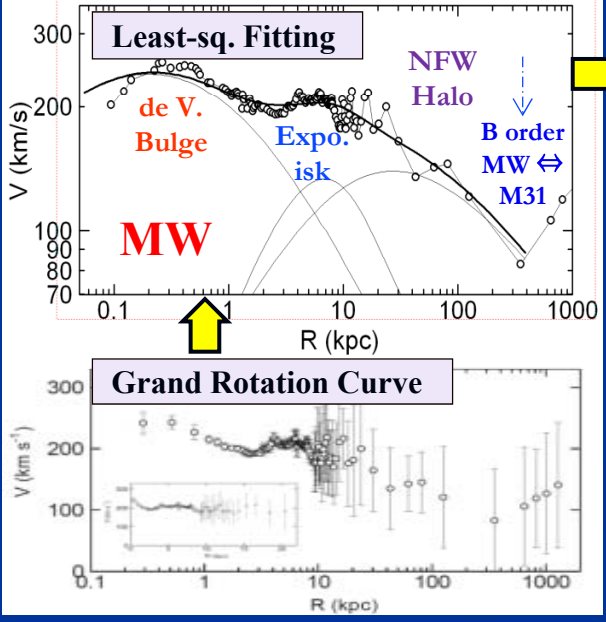
(2) Least squares fitting by the de Vaucouleurs $e^{-r\wedge 1/4}$ Bulge, Exponential Disk and NFW-profile Halo resulted in parameters as listed in Table.

(3) The Local DM density at Sun is estimated to be ρ_0= 0.235±0.030 GeV cm^{-3}.

(Y.Sofue 2012, PASJ 64, in press.)

$V_0/R_0=\Omega_0$ (km s^{-1} kpc^{-1})	ρ_0 (GeV cm^{-3})
Sofue (2012)	
200/8.0 =25.0	→ 0.235±0.030
(248/8.2 = 30.3	0.345 ±0.044)
Salucci, et al. (2011)	
(200/8.0 = 25.0	0.29 ± 0.07)
248/8.2 = 30.3	→ 0.43 ±0.11

M~RV^2/G
ρ_0~M/R^3
~(V/R)^2~ Ω^2



Galactic Parameters

Table 1. Best-fit parameters for the mass components of the Galaxy

Mass component	Mass; Density	Scale Radius
Bulge param.	$M_b = (1.652 \pm 0.083) \times 10^{10} M_\odot$	$a_b = 0.522 \pm 0.037$ kpc
Disk param.	$M_d = (3.41 \pm 0.41) \times 10^{10} M_\odot$	$a_d = 3.19 \pm 0.35$ kpc
B+D Mass	$M_{b+d} = (5.06 \pm 0.97) \times 10^{10} M_\odot$	
B/D ratio	$M_b/M_d = 0.48 \pm 0.09$	
DH param.	$\rho_0 = (1.06 \pm 0.14) \times 10^{-2} M_\odot$pc^{-3} $= 0.403 \pm 0.051$ GeV cm^{-3}	$h = 12.53 \pm 0.88$ kpc
Local DM dens. at $R_0 = 8$ kpc	$\rho_0^\odot = (6.12 \pm 0.80) \times 10^{-3} M_\odot$pc^{-3} $= 0.235 \pm 0.030$ GeV cm^{-3}	
DH Mass‡	$M_h(R \le 8\text{kpc}) = (2.71 \pm 0.42) \times 10^{10} M_\odot$ $M_h^*(\le h) = (5.05 \pm 0.78) \times 10^{10} M_\odot$ $M_h(\le 20\text{kpc}) = (8.87 \pm 1.37) \times 10^{10} M_\odot$ $M_h(\le 385\text{kpc}) = (6.52 \pm 1.01) \times 10^{11} M_\odot$	
Galaxy Mass	$M_{b+d+h} = (7.03 \pm 1.01) \times 10^{11} M_\odot$	($R \le 385$ kpc)
Baryon Fraction	$M_{b+d}/(M_{b+d+h}) = 0.072 \pm 0.018$	