R16c On the dynamical mass of galaxies

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Applying the circular velocity curve, $V_c(R)$, derived by Kalinova et al.(2017: MNRAS, 469, 2539) for over 200 CALIFA galaxies, which represents the gravitation potential profile at $z = 0$, a proxy of dynamical mass of a galaxy (including all gravity sources: stars, dust, gas, black hole, and dark matter), $M_{\rm dyn}$, can be defined as $\log M_{\rm dyn} = 2 \log V_c(R_f) + \log R_f - \log G$, where R_f is $1.5R_e$ and G the gravitation constant. The relation between the stellar mass, M^*, and $M_{\rm dyn}$ of sample galaxies was found to be bi-modal, with the mode transition from the low mass disk-type galaxies to the massive ellipsoidal galaxies around $\log M_{\rm dyn} \sim 11.0$ in solar mass unit. This $\log M^*$ vs. $\log M_{\rm dyn}$ diagram has similarity in its form to the stellar-to-halo mass relation (SHMR: L.Posti and S.M.Fall 2021: A&A, 69, A119), $\log M^*$ vs. $\log M_{\rm halo}$. A well-devised transformation $\log M_{\rm dyn} = 0.5 \log M_{\rm halo} + 4.8$ brings both figures to close matching (see figure in poster). This empirical log-linear relation may reflect the presence of some sort of the acting universal physics of the parent dark halo controlling the baryon falling-into or expelled-out of the central gravitation potential vessel to form a galaxy over a wide mass range of $\log M^* = 8.5 \sim 11.5$.