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The expected shape of the Milky Way's dark matter halo

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Given the elusive nature of Dark Matter (DM), indirect measurements are the most common approach to study it observationally. However, to make these studies possible, some assumptions must be made. These assumptions come from complicated theoretical frameworks and the analysis of state-of-the-art cosmolofical simulations. In this work we study the shape of the DM halo of Milky Way-like galaxies from the Auriga simulations. We focus on the radial and time dependence. We found that, on DM-only and Magneto-hydrodynamic (MHD) simulations, the shape of the DM halo is more triaxial in the inner-skirts than in the outter-skirts. We compared simulations with and without gas and verified that the presence of visible matter has an effect of rounding the DM halo which is amplified for smaller radii, where the gravitational potential of the galactic disk becomes more significant. Regarding the effect of time on the DM halo shape, we corroborated that it is well-conserved in comoving units until $z \approx 2$. This means that probing the halo shape in physical units at the virial radius for different redshifts is nearly equivalent to probing the shape at different radii at redshift 0. These results are in accordance with previous work on cosmological and galactic-size simulations, and may serve as guidelines to improve observational constraints on our MW DM halo.

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