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# A detailed characterisation of low-mass dark matter subhalo tidal tracks via numerical simulations

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A number of studies assert that dark matter (DM) subhaloes without a baryonic counterpart and with an inner cusp always survive no matter the strength of the tidal force they undergo.
In this work, we perform a suite of numerical simulations specifically designed to analyse the evolution of the circular velocity peaks ($V_{\mathrm{max}}$, and its radial value $r_{\mathrm{max}}$) of low-mass DM subhaloes due to tidal stripping. To perform this task, we have employed the improved version of the DASH library, introduced in our previous work Aguirre-Santaella et al. (2023) to study subhalo survival.
More specifically, we follow the tidal evolution of a single DM subhalo orbiting a Milky Way (MW)-size halo, the latter with a baryonic disc and a bulge replicating the actual mass distribution of the MW. We simulate subhaloes with unprecedented accuracy, varying their initial mass, concentration, orbital parameters and inner slope (NFW and prompt cusps are considered). We also consider the effect of the time-evolving gravitational potential of the MW itself.
Here, we also broaden our vision with respect to previous literature not just characterizing tidal tracks at the apocentres, but exploring the pericentres as well. Several important discrepancies arise, especially with respect to works that do not account for baryonic material inside the host.
For our fiducial setting, we find $V_{\mathrm{max}}$ to change approximately the same after each orbital period, whilst $r_{\mathrm{max}}$ decreases less drastically for later orbits. This implies a larger increase in velocity concentrations for the first orbit compared to subsequent ones.
In general, $r_{\mathrm{max}}$ shrinks more than $V_{\mathrm{max}}$, leading to a continuous rise of subhalo concentration with time. The velocity concentration at present is found to be up to two orders of magnitude higher than the one at infall.
These findings significantly enhance our understanding of the dynamics and properties of low-mass DM subhaloes, providing valuable insights for future research, simulations and observations, as well as for indirect searches of DM.

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