How could super-precision astrometry change our view of dwarf galaxies?

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Abstract

Dwarf spheroidal galaxies serve as crucial laboratories for unraveling the mysteries of the dark Universe, particularly concerning the nature of dark matter and the possible presence of rare compact objects. These galaxies are large dark matter reservoirs, and their low stellar content allows for close comparison with cosmological simulations where baryons are not finely resolved, hence being great laboratories to test the nature of dark matter on the nearby Universe. Additionally, a number of recent studies have proposed that some dwarf galaxies could harbor elusive intermediate-mass black holes in their cores, which would enlighten our understanding of black hole demographics and galaxy evolution. However, current astrometric capabilities that aim to study these systems are hampered by limitations in time baselines and/or field coverage, leaving our knowledge of dwarf galactic dynamics downplayed to a single velocity dimension. In this presentation, I delve into the transformative potential of a future space mission equipped with high precision astrometry, while addressing the key requirements necessary to overcome the obstacles faced by current space observatories and how this will help us to better understand Dwarf spheroidal galaxies and their connection to the dark Universe.

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