Shedding light on low-mass subhalo survival with numerical simulations

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37^{th} International Cosmic Ray Conference (ICRC 2021)
July 12th – 23rd, 2021
Online – Berlin, Germany

There is strong evidence to believe that most of the matter in our Universe is dark. This dark matter (DM) has not been detected in laboratories, yet its gravitational effects have been observed from the innermost regions of galaxies to the large-scale structure of the Universe.
Indirect detection seeks to detect gamma rays and other Standard Model products that could be produced if DM is a particle that self-annihilates.
In this work, we carry out a suite of specially-designed numerical simulations to shed further light on dark matter (DM) subhalo survival at mass scales relevant for gamma-ray DM searches, a topic subject to intense debate nowadays. Specifically, we have employed an improved version of DASH, a GPU N-body code, to study the evolution of low-mass subhalos inside a Milky Way-like halo with unprecedented accuracy. We have simulated subhalos with varying mass, concentration, and orbital properties, and considered the effect of the gravitational potential of the Milky-Way galaxy itself. In addition to shedding light on the survival of low-mass galactic subhalos, our results will provide detailed predictions that will aid current and future quests for the nature of dark matter.