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The Impact of Dark Matter Microhalos on Signatures for Direct and Indirect Detection

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Detecting dark matter as it streams through detectors on Earth relies on knowledge of its phase space density on a scale comparable to the size of our solar system. Numerical simulations predict that our Galactic halo contains an enormous hierarchy of substructures, streams and caustics, the remnants of the merging hierarchy that began with tiny Earth mass microhalos. If these bound or coherent structures persist until the present time, they could dramatically alter signatures for the detection of the wimp.

Using numerical simulations that follow the coarse grained tidal disruption within the Galactic potential and fine grained heating from stellar encounters, we find that microhalos, streams and caustics have a negligible likelihood of impacting direct detection signatures implying that dark matter constraints derived using simple smooth halo models are relatively robust. We also find that many dense central cusps survive, yielding a small enhancement in the signal for indirect detection experiments.

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