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Phase-space distribution of unbound dark matter near the Sun
MOQBIL ALENAZI, PAOLO GONDOLO, Department of Physics, University of Utah, 115 S 1400 E Rm 201, Salt Lake City, Utah 84112-0830, USA — We resolve discrepancies in previous analyses of the flow of collisionless dark matter particles in the Sun's gravitational field. We determine the phase-space distribution of the flow both numerically, tracing particle trajectories back in time, and analytically, providing a simple correct relation between the velocity of particles at infinity and at the Earth. We use our results to produce sky maps of the distribution of arrival directions of dark matter particles on Earth at various times of the year. We assume various Maxwellian velocity distributions at infinity describing the standard dark halo and streams of dark matter. We illustrate the formation of a ring, analogous to the Einstein ring, when the Earth is directly downstream of the Sun.

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