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Ultralight Dark Matter in the Solar System: Numerical Approaches[1] NOAH ANDERSON, ANGELINA PARTENHEIMER, Truman State University (student), TIM WISER, Truman State University (professor) — Dark matter is known to be gravitationally bound to the Milky Way galaxy and thus passes through our Solar System. Attempts to detect dark matter passing through the solar system are already underway with projects like ADMX. If dark matter were trapped in the protosolar nebula of the sun, then a significant density could be present at Earth today, if the dark matter was not expelled from the solar system by gravitational perturbations due to Jupiter or other planets. In order to investigate the longevity of dark matter in Solar orbits we combined analytic results (where possible) with numerical simulations. The effects of Jupiter were studied by numerically integrating the equations of motion for dark matter particles. Since direct detection of dark matter requires Earth-crossing orbits, we also considered the gravitational effects of close encounters with Earth. The effects of repeated close encounters were treated statistically. We conclude that, in the absence of non-gravitational interactions, a significant fraction of an initial dark matter population could remain today

[1]McNair program

Noah Anderson
Truman State Univ

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