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The Dynamical Response of Dark Matter to Galaxy Evolution Affects Direct-Detection Experiments MICHAEL PETERSEN, NEAL KATZ, MARTIN WEINBERG, Univ of Mass - Amherst — Over a handful of rotation periods, dynamical processes in barred galaxies induce non-axisymmetric structure in dark matter halos. Using n-body simulations of a Milky Way-like barred galaxy, we identify both a trapped dark-matter component, a shadow bar, and a strong response wake in the dark-matter distribution that affects the predicted dark-matter detection rates for current and future experiments. We find that the magnitude of the combined stellar and shadow bar evolution makes a 30% increase in disk-plane density. This is significantly larger that of previously claimed deviations from the standard halo model. The dark-matter density and kinematic wakes driven by the Milky Way bar increase the detectability of dark matter overall, especially for the experiments with higher minimum velocities. These astrophysical features increase the detection rate by more than a factor of two when compared to the standard halo model and by a factor of ten for experiments with high minimum recoil energy thresholds. These same features increase (decrease) the annual modulation for low (high) minimum recoil energy experiments. We present physical arguments for why these dynamics are generic for barred galaxies such as the Milky Way rather than contingent on a specific galaxy model.

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