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A search for BH dark matter using microlensing in the Dark Energy Survey

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Massive Primordial Black Holes (MPBH) generated from large inflation-era curvature fluctuations that reenter during the radiation era could constitute the majority of the dark matter, an idea revived by the LIGO observations of merging 30 solar mass black holes. In this model, the mass distribution of MPBH ranges from 0.01 to 100 solar masses, peaking perhaps at 50 solar masses. There is, remarkably, a window in the constraints at these masses; furthermore the MPBH could be clustered, breaking one of the assumptions of microlensing limits. We describe a project that uses the Dark Energy Survey data to perform a microlensing measurement of massive compact objects at 10-100 solar masses. The key idea is that a microlensing event has a duration of t = 2.5 years (M/10M_solar)^{1/2} and thus masses in the range expected for MPBH are observable in the DES. The DES observes its entire footprint twice per year per bandpass, so there are 8 usable visits per year as microlensing is achromatic. The primary difference between this project and the MACHO/OGLE/EROS surveys is that we will use the 10^7 field stars in the DES south galactic cap and not the LMC or Galactic Center. We will describe our expected limits on MPBH mass distributions assuming they make up all of the dark matter.

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