

# The Search for Massive Primordial Black Holes in the Milky Way

*Tuesday, August 15, 2017 11:10 AM (20 minutes)*

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Abstract: Massive Primordial Black Holes (MPBH) 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. This project uses the Dark Energy Survey data to perform a microlensing measurement of massive compact objects at 10-100 solar masses. Microlensing occurs when MPBH passes in front of a background star, briefly brightening the output from that star. The key idea is that a microlensing event has a duration of roughly  $t = 2.5$  years and thus masses in the range expected for MPBH are observable in the DES.

In this project, we created mock light curve events for stars in the Dark Energy Survey (DES). First, we reduce our sample size by removing galaxies and over-saturated objects. We then utilized the initial magnitudes, the observation times, and the calculated errors in our code. By using these data, as well as varying unknown parameters of the MPBHs, we create approximately 50,000 light curves per sampled star. These mock light curves will support in determining the efficiency of the current fitting algorithm, as well as any future algorithms. Our project will directly support the creation of efficiency maps which will help determine the number of actual events to expect within the DES.

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