

Abstract Submitted
for the APR17 Meeting of
The American Physical Society

Constraints on MACHO Dark Matter from Compact Stellar Systems in Ultra-Faint Dwarf Galaxies TIMOTHY BRANDT¹, Institute for Advanced Study — I show that a recently discovered star cluster near the center of the ultra-faint dwarf galaxy Eridanus II provides strong constraints on massive compact halo objects (MACHOs) of $>5 M_{\odot}$ as the main component of dark matter. MACHO dark matter will dynamically heat the cluster, driving it to larger sizes and higher velocity dispersions until it dissolves into its host galaxy. The stars in compact ultra-faint dwarf galaxies themselves will be subject to the same dynamical heating; the survival of at least ten such galaxies places independent limits on MACHO dark matter of masses $>10 M_{\odot}$. Both Eri II's cluster and the compact ultra-faint dwarfs are characterized by stellar masses of just a few thousand M_{\odot} and half-light radii of 13 pc (for the cluster) and ~ 30 pc (for the ultra-faint dwarfs). These systems close the ~ 20 – $100 M_{\odot}$ window of allowed MACHO dark matter and combine with existing constraints from microlensing, wide binaries, and disk kinematics to rule out dark matter composed entirely of MACHOs from $\sim 10^{-7} M_{\odot}$ up to arbitrarily high masses.

¹NASA Sagan Fellow

Timothy Brandt
Institute for Advanced Study

Date submitted: 29 Sep 2016

Electronic form version 1.4