

# Dark matter Annihilation in Most Luminous and the Most Massive Ultracompact Dwarf Galaxies (UCD)

*Tuesday, 28 July 2020 15:30 (25 minutes)*

We explore the potential astrophysical signatures of dark matter (DM) annihilations in ultracompact dwarf galaxies (UCDs) considering two of the richest known galaxy clusters within 100 million light-years, nominally, Virgo and Fornax. Fornax UCD3 is the most luminous UCD and M59 UCD3 is the most massive UCD. With the detection of a 3.5 million solar mass black hole (BH) in Fornax UCD3, we carefully model several DM enhanced profiles scenarios, considering both the presence of the supermassive black hole (SMBH) and DM. For Fornax UCD3, the comparison of the stellar and dynamical masses suggests that there is little content of DM in UCDs. M59 UCD3 did not receive the same attention in simulations as Fornax UCD3, but deep radio imaging and X-ray observations were performed for M59 UCD3 and can be used to place limits in DM content of these UCDs. We work with an average estimative of dark matter content considering the Salpeter and Kroupa mass functions. We model Fornax UCD3 and M59 UCD3 to have a DM content that is the average of these mass functions. We then analyze the constraints for Fornax and M59 UCD3 coming from gamma-ray and radio sources considering in our simulations, a dark matter particle with mass between 10 – 34 GeV. In the absence of strong  $\gamma$ -ray signatures, we show that synchrotron emission from electrons and positrons produced by DM annihilations can be very sensitive to indirect DM search. We find that DM parameters can be significantly constrained at radio frequencies and the spike profiles play an interesting role in order to deep study the enhancements of DM & BH interactions in ultracompact galaxies.

## Secondary track (number)

**Primary authors:** Prof. ELAINE, Fortes (Unipampa); Prof. MIRANDA, Oswaldo (INPE); Prof. WUENSCHÉ, Carlos (INPE); Prof. STECKER, Floyd (NASA Goddard Space Flight Center)

**Presenter:** Prof. ELAINE, Fortes (Unipampa)

**Session Classification:** Astro-particle Physics and Cosmology

**Track Classification:** 08. Astro-particle Physics and Cosmology