Contribution ID: **97** Type: **not specified**

Limits on Dark Matter Annihilation from the Shape of Radio Emission in M31

Tuesday 9 May 2023 18:15 (15 minutes)

Well-motivated scenarios of thermally-produced dark matter often result in a population of electrons and positrons within galaxies produced through dark matter annihilation – often in association with high-energy gamma rays. As they diffuse through galactic magnetic fields, these $e^{\pm}$ produce synchrotron radio emission. The intensity and morphology of this signal depends on the properties of the interstellar medium through which the $e^{\pm}$ propagate. Using observations of the Andromeda Galaxy (M31) to construct a model of the gas, magnetic fields, and starlight, we set constraints on dark matter annihilation to $b\bar{b}$ using the morphology of 3.6˜cm radio emission. As the emission signal at the center of M31 is very sensitive to the diffusion coefficient and dark matter profile, we base our limits on the differential flux in the region between 0.9-6.9˜kpc from the center. We exclude annihilation cross sections $> 3 \times 10^{-25}$ cm^3/s in the mass range $10 - 500$ GeV, with a maximum sensitivity of 7×10^{-26} cm^3/s at $20 - 40$ GeV. Though these limits are weaker than those found in previous studies of M31, they are robust to variations of the diffusion coefficient

Primary authors: BUCKLEY, Matthew; WEIKERT, Mitchell (Rutgers University)

Presenter: WEIKERT, Mitchell (Rutgers University)

Session Classification: BSM XII

Track Classification: BSM