

Prospects of constraining WIMP using black hole low-mass X-ray binaries

Wednesday, 24 July 2024 11:35 (25 minutes)

The fast orbital decay observed in some of the Galactic black hole Low-Mass X-ray binaries (BH-LMXBs) (of a few solar masses) can be explained by the dynamical friction between Dark Matter (DM) and the companion stars orbiting around the BHs. In these cases the values of the index of the DM spike surrounding the BHs can be pinned down with an accuracy of a few percent, way better than that for much bigger systems such as the super massive BHs (SMBHs). I will show that the observational data from such a BH-LMXB, named XTE J1118+480, allow to constrain the WIMP DM annihilation cross section times velocity $\langle\sigma v\rangle$ below its thermal value for DM masses up to the TeV scale. The constraints are driven mainly by the radio synchrotron signal produced by the DM induced e^+ propagating in the magnetic field near the BH. The bound from XTE J1118+480 is stronger than those from SMBHs when the very large uncertainties on the spike indices corresponding to the SMBHs are taken into account. I will show that taken at face value the bound from XTE J1118+480 on $\langle\sigma v\rangle$ is the most constraining compared to those obtained from other experiments for DM mass < 1 TeV, unless the intensity of the magnetic field is significantly smaller than its equipartition estimation.

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Session Classification: Presentations