Measuring the Dark Matter Content of NGC5102 Using Combined Observations of Gas and Stars

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Since the 1930s, dark matter (DM) has accounted for a host of astronomical observations that cannot be explained using the standard physics model, such as the discrepancy in rotation curves between predicted stellar mass and measured circular velocities. In a paper on galaxy NGC5102, Mitzkus et al. (2017) used purely stellar data tracers to derive the galaxy's DM mass, omitting outer region stellar mass due to dataset limitations, leaving room for improvement. This study asks to what extent do combined stellar and HI-gas observations derive a more accurate DM fraction of galaxy NGC5102. An expanded stellar dataset was developed and analyzed using only a HI-gas tracer. However, this derived no significantly different DM fraction, having a value of 0.30 (+0.06,-0.05). A significantly different DM fraction of 0.15 (+0.04, -0.03) was subsequently calculated using both HI-gas and stellar tracers. These results verified a valid improvement upon current methods to derive DM fractions. Future research is suggested to utilize this methodology upon the Hector and WALLABY galaxy surveys, to enable more accurate research of DM, behavior, and its implications upon galaxy formation and evolution (Koribalski. B et al, 2019).

Awards Won:
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