Calculation of Dark Matter in S0 g Galaxy NGC3115 - Galaxy Mass Discrepancy and Escape Velocity Analysis

Katz, Judd (School: Moriah College)

The existence of non-luminous mass, known as ‘dark matter’ (DM) poses one of the greatest problems in astrophysics. The proceeding correlational study investigates the existence of DM in S0 galaxy NGC3115. The existence of DM is supported by analysing the dynamical and stellar mass of NGC3115 and the corresponding escape velocities. The results suggest a stellar mass of 0.85±0.0048 10^11 M ⊙, and dynamical mass of 1.80 ± 0.58 10^11 M ⊙ , supporting the existence of 0.95±0.58 10^11 M ⊙ dark matter mass, accounting for 53± 17% of NGC3115. However, contradicting this result it was found that the rotational velocity of the globular clusters in NGC3115 was less than the escape velocity of NGC3115 (utilising stellar mass as the estimation of the galaxies mass) , indicating that non-luminous mass is not required to sustain the observed rotational velocity of the globular clusters in NGC3115, supporting a null result in proving the existence of DM. This paper also discusses the validity of using the novel method of a galaxy’s escape velocity as a proxy for determining DM and Aquino-Ortiz et al.’s (2018) dynamical mass model.