

Title

Corvus A: A low mass, isolated galaxy off the baryonic Tully-Fisher relation?

Abstract

Corvus A is a recently discovered extremely low mass ($M_{\text{star}} \sim 10^6 M_{\text{sol}}$), star-forming dwarf irregular that is remarkably isolated. VLA observations have revealed that it hosts a rich HI gas reservoir, but these data lack the angular resolution to perform a detailed assessment of its gas morphology and kinematics. In this mass regime there are barely any objects on the baryonic Tully-Fisher relation (BTFR; the empirical scaling relation between galaxy rotation velocity and baryonic mass), but it is a critical regime to study as it is where simulations predict that the BTFR should deviate from linearity due to stellar feedback. The stellar body of Corvus A implies that the galaxy is quite inclined, however, the VLA suggests the gas disk could be close to face-on, but it is too poorly resolved to be certain. In this proposal we show that, based on its optical inclination, Corvus A appears to deviate significantly from the BTFR in the opposite sense to that predicted by simulations. Given the relative lack of other viable sources in this mass range it is vital to determine if this deviation is robust or the result of systematic uncertainties, and this can only be achieved with high resolution HI observations. MeerKAT's superior sensitivity and uv-coverage make it the only viable instrument for this science case. We request 5h of time to produce a detailed map of HI in Corvus A, fit its gas kinematics, and robustly determine its location relative to the BTFR.