

**PROBING THE PHYSICS OF GAS, DUST AND STELLAR POPULATIONS
ACROSS THE DISC OF THE NEARBY SPIRAL GALAXY NGC 3938**

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ABSTRACT

Molecular gas and dust are the key ingredients for star formation in galaxies. Since spiral galaxies are rich in molecular gas and dust, they are ideal targets to better understand the star formation processes compared to the elliptical and lenticular galaxies poor in gas and dust. Using the literature data of multiple CO lines (along with far-infrared (FIR) and far-ultraviolet (FUV) data) we study the physical properties of the interstellar medium (ISM) across the entire gaseous and dusty disc of the spiral galaxy NGC 3938. We obtained the data from multiple sky surveys including the CO Multi-line Imaging of Nearby Galaxies (COMING) survey (for ^{12}CO (1-0) and ^{13}CO (1-0) data), the HERA CO-Line Extragalactic Survey (HERACLES) [for ^{12}CO (2-1) data], James Clerk Maxwell Telescope Nearby Galaxy Survey [JCMT NGS; for ^{12}CO (3-2) data], SPITZER infrared survey (for the FIR data at 24 μm , 70 μm and 160 μm), and finally The Galaxy Evolution Explorer (GALEX) survey (for FUV data). We defined seven positions along the major axis of the galaxy, allowing us to study the physics of the ISM without selection bias. We also targeted 13 positions bright in 24 μm emission over the spiral arms. We obtained multiple CO line ratios [i.e. ^{12}CO (1-0)/ ^{13}CO (1-0), ^{12}CO (2-1)/ ^{12}CO (1-0) and ^{12}CO (3-2)/ ^{12}CO (1-0)], molecular gas mass, FUV and FIR emission, and the extinction (i.e. FUV/24 μm ratio) at each position studied. Our preliminary results indicate that almost all physics properties show a good negative correlation with the galactocentric distance. Any correlations between the pair of parameters will further be studied, and the physical properties in the disc of the galaxy will be compared with that in other galaxies from different Hubble types.

Keywords: Spiral Galaxies, Molecular Gas, Interstellar Dust, Far-ultraviolet Radiation, Far-infrared Radiation