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➤ ORAL PRESENTATION

Physical properties of the gas and dust across the disc of a nearby spiral galaxy NGC 3556

Selçuk Topal (<https://orcid.org/0000-0003-2132-5632>)

Van Yüzüncü Yıl University, Faculty of Science, Department of Physics, Van, Turkey.

Corresponding author e-mail: selcuktopal@yyu.edu.tr

Abstract

The multiple-line study is a powerful tool to understand star formation processes in galaxies better. In this study, we probe the physics and kinematics of the gas, and star formation by combining the literature data of carbon monoxide (CO), K-band (2.2 μ m), 3.6 μ m and far-ultraviolet (FUV) emissions obtained over the disc of the spiral galaxy NGC 3556. We defined a contiguous region for the CO emission and obtained the integrated line intensity and velocity maps along with position-velocity diagrams. The intensity maps reveal that $^{12}\text{CO}(1-0)$ extends to 150" on either side of the disc, while $^{13}\text{CO}(1-0)$ extends to a much smaller radius with a patchy distribution. $^{12}\text{CO}(1-0) / ^{13}\text{CO}(1-0)$ ratio is higher in the south of the galaxy center, indicating a more diffuse gas which could be a result of a strong star formation activity. CO position-velocity diagrams indicate the existence of a single slowly rising velocity component, which is not reaching the flat part of the rotation curve, and there is a disturbance in the gas kinematics in the SE of the galaxy center. A combination of 3.6 μ m and FUV provides insights into stellar populations. Although the 3.6 μ m is mostly centrally concentrated compared to the FUV, 3.6 μ m peak emissions reconcile with the FUV peaks at some positions in the arms. This indicates that the dust is heated by the strong UV emission from young massive stars at those positions. While the 2.2 μ m and 3.6 μ m emissions are brighter in the center compared to the arms, the FUV emission is the opposite; deficient in the center and brighter at some regions along the arms. Although the line of sight could be an important factor for the FUV deficiency in the center (i.e. by the dust obscuration), this could also indicate a population of old stars in the center.

Keywords: galaxies, spiral galaxies, molecular gas, dust, star formation