X76a Application of machine learning methods to analyze the spatially resolved SFR–stellar mass relation

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Recent studies have shown that the star formation rate(SFR) surface density traces the stellar mass surface density in kpc scales, giving the Kennicutt-Schmidt (K-S) law (Kennicutt Jr, 1989). This resolved relation indicates the connection between the global star formation main sequence (SFMS) and the local star formation process. However, a united explanation combining both theory and observation is still waiting to be established.

We made an extensive analysis of the SFMS based the DustPedia database (Davies et al., 2017). We provide a new division method to define the "spaxels" (meaning space-pixel) in the 2D galaxy band maps, each with 1kpc interval, to represent the relative position of the spaxel inside the galaxy. We study the SFR, mass and band data variance in every spaxel with respect to their galactocentric radius. This agrees with the "inside-out quenching" scenario for galaxy formation and evolution.

We identify the star forming regions with various algorithms. (K-means, affinity propagation and Gaussian Mixture). We use manifold learning to parameterize the star formation status for different areas inside galaxies. Based on the results, we will discuss the quenching process and star formation mechanism for these galaxies.