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LOOKING FOR OBSERVATIONAL EVIDENCE OF STAR FORMATION STOCHASTICITY IN THE CALIFA DATASET

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In this work, we study spectral data published by the CALIFA survey. When analyzing regions of low star formation rate (SFR) we find fluctuations of the H_α/H_β which are not fully explained by interstellar dust effects. We propose that the detected fluctuation is due to the influence of stochastic effects, which have been quantified in previous simulations.

Using the CALIFA data published by PIPE3D (Sánchez et al. 2016), we study the ratio between the H_α and H_β emission line intensities. According to simulations, regions of low SFR are susceptible to stochastic effects due to irregular bursts of star formation as well as finite sampling in mass and time.

The combination of these factors is believed to cause fluctuation of emission line intensities (Forero-Romero & Dijkstra 2013). With the CALIFA data, we make a histogram of the H_α/H_β value distribution, discriminating data according to high SFR $\left(> 1.89 \times 10^{-1}\,M_\odot yr^{-1}\right)$, low SFR $\left(< 2.99 \times 10^{-2}\,M_\odot yr^{-1}\right)$ and a region in between. This provides a visualization of emission line fluctuations according to different SFR.

Forero-Romero & Dijkstra (2013) studied the fluctuations of the Ly_α Equivalent Width (EW) in idealized galaxies where stochasticity effects were included. They found that as SFR goes down the EW fluctuations increase, following the same behavior as the H_α/H_β histograms.

Despite lacking dust effect corrections, we suggest that stochasticity as a significant influence in low SFR regions. This is because dust is not as abundant in low SFR regions as it is in high SFR regions. Furthermore, interstellar reddening causes fluctuation in only one direction, which is not the case for the data. In our results, data associated with low SFR values is clearly more broadly distributed than at higher SFR. A fitting procedure was performed on the observed distributions and was found to follow the behaviour described in simulations by Forero-Romero & Dijkstra (2013).

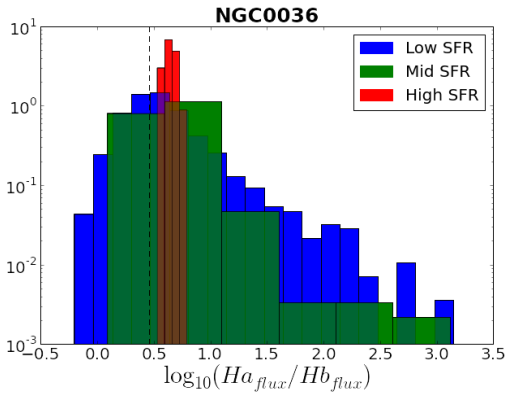

Fig. 1. Distribution of H_α/H_β values according to high, mid or low SFR. The vertical dashed line represents the expected value from atomic physics.

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