Variations in the Evolution of Star-Forming Galaxies Through the Last 10 Gyr

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Despite much progress, several important discrepancies between state-of-the-art models and observational studies in extragalactic astronomy subsist, particularly for star-forming galaxies. To shed further light into the evolution of star-forming galaxies, this project presents an evolutionary study of the universe by analysing several physical parameters of luminous H-alpha galaxies. Our data were drawn from a sample containing 443 distant universe galaxies, and from a sample containing 300 local universe galaxies, homogeneously selected. We morphologically analysed all galaxies and calculated key physical properties, such as star formation rates (SFR), colour indices and photometric fluxes, using only free and easy-use software. By developing a novel galaxy classification method, we have been able to detect new tendencies in the structural evolution of star-forming galaxies over time. We find that the percentage of irregular galaxies decreases over time (towards the present) as the percentage of disc-like galaxies increases in similar proportions. We predict that the expansion of the universe, increasing distances between neighbour galaxies, causes irregular galaxies to form accretion discs, transforming into disk-like galaxies. We also predict that this tendency will continue for the future, with disc galaxies being the dominating morphology. By correlating colour indices, we found evidence that the evolution of an expanding universe is consistent with star-forming galaxies becoming dominated by older star populations as a function of time, coincident with lower and more stable SFR and independent from morphology. We interpret this phenomenon being likely driven by decreasing gas fractions and less detectable dust.

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