New insights on the evolution of Halpha equivalent width and sSFR up to $z \sim 5$

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The evolution of the physical properties of galaxies such as the stellar mass and the star formation rate (SFR) have been (and are) extensively analysed using photometric data in a wide range of redshifts. However, these results rely on fitting their spectral energy distributions (SEDs) where rest-frame optical nebular emission lines (e.g., H*alpha*) may contaminate the broad-band fluxes and bias the results inferred. Actually, recent works have shown that the specific SFR seems to evolve far less rapidly than expected in most theoretical models. In addition, it has been claimed that the equivalent width (EW) of H*alpha* evolves rapidly with redshifts, which it is difficult to understand since the H*alpha* EW should be a reasonable proxy for the sSFR.

In this work, we combine the best-available broad-band photometry in CANDELS with new near-infrared spectroscopy taken from the 3D-HST survey for a sample of star-forming galaxies at intermediate redshifts ($z \sim 1.3$) to robustly test a method to infer reliable measurements of Hapha from the flux excess between observations and the SED fitting. Following this method, we revisit the photometric data available for galaxies up to $z \sim 5$ to trace the evolution of the equivalent width of H*alpha*. I will show here that, in contrast with previous works, we find a mild evolution of Halpha, much slower than the expected from the extrapolation of observations at lower redshifts. Moreover, we find that certainly the Halpha EW follows the evolution of the sSFR. Finally, I will discuss these results and their implications for our understanding of galaxy evolution.