The SAMI Galaxy Survey: energy sources of the turbulent velocity dispersion in spatially-resolved local star-forming galaxies

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We investigate the energy sources of random turbulent motions of ionised gas from Hα emission in eight local star-forming galaxies from the Sydney-AAO Multi- object Integral field spectrograph (SAMI) Galaxy Survey. These galaxies satisfy strict pure star-forming selection criteria to avoid contamination from active galactic nuclei (AGN) or strong shocks/outflows. Using relatively high spatial and spectral resolution of SAMI, we find that, on sub-kpc scales our galaxies display a flat but elevated distribution of ionised gas velocity dispersion as a function of star formation rate (SFR) surface density, suggesting that star formation feedback is not the only source of random motions in local star-forming galaxies. Our sample shows the same positive correlation between ionised gas velocity dispersion and SFR surface density as local Hα luminous galaxies and high redshift star-forming galaxies. Our results suggest that additional sources beyond star formation feedback contribute to driving random motions of the interstellar medium (ISM) in star-forming galaxies. We speculate that gravity, galactic shear, and/or magnetorotational instability (MRI) may be additional driving sources of turbulence in these galaxies.