The growth of typical star-forming galaxies and their super massive black holes across cosmic time: consequences for AGN feedback/quenching

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Abstract

Understanding galaxy formation and evolution requires the understanding of both the star formation history (the growth of galaxies) and black hole accretion history (the growth of their black hole), and how they influence each other in order to obtain a strong correlation in the Local Universe. By using a sample of typical star-forming galaxies, selected based on their Hα emission with the HiZELS survey at various look-back times, we study both the nature and evolution of such sources. We use a truly multi-wavelength approach, by using direct detections but also relying on stacking in the X-rays, far-infrared (FIR) and radio, along with the wealth of multi-wavelength data in COSMOS to study the relative growth between typical galaxies, from z=2.23 to z=0.4, and their black holes. We find that the fraction of AGN increases with Hα luminosity and that black hole growth and galaxy growth are always correlated, reaching the necessary ratio for the Local relation by z$\sim$1. Our results may be providing empirical evidence for the relative increase of AGN feedback in quenching star-formation, at least from z$>$2 to z$\sim$1, and have important consequences for our understanding of how galaxies like our own evolved in the last 11 Gyrs.