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"Black Hole Evolution over Cosmic Time: Mergers Outflows and Feedback"

The formation and evolution of supermassive black holes (BHs) follow galaxy evolution from very early epochs to the present time. In particular, black hole growth by mergers and gas accretion seems to be parallel to galaxy growth by mergers and accretion from the inter-galactic medium. The evolution of galaxies and BHs are also linked at their ends when mass outflow driven by the central AGN can quench star formation and terminate the accretion onto the central BH.

In this talk I will summarize information collected in recent years about the relationships between BH mass and stellar mass, BH accretion and star formation, and AGN induced outflows, focusing on three well studied epochs in the evolution of the universe: z~5-7, z~2-3 and z~0.1. It seems that several assumptions made by modern numerical simulations of galaxy evolution are not fully supported by the new observations, especially those related to AGN feedback. I will show that AGN feedback based on the measurements of large-scale ionized gas flows was over estimated in the past and how obscured star forming regions not considered until recently affect the correlation between stellar mass growth and BH growth in local galaxies.