

Astronomy Seminar
January 18, 2017

Title - What drives the evolution of galaxies like the Milky Way?

Abstract - Galaxies with masses similar to the Milky Way are very diverse, spanning the range from disks with large amounts of star formation to elliptical galaxies without any detectable star formation. What are the forces that shape this evolution, leading to this wide range in outcomes? I present work that explores the role of two possible forces, AGN feedback and galaxy merging.

I show that quiescence among Milky Way mass galaxies is strongly related to the prominence of its supermassive black hole, in excellent qualitative accord with models in which quiescence is driven by long-term energy input from AGN feedback. Galaxies which end up with relatively large supermassive black holes are quiescent, those that avoided forming a large central black hole remain star forming.

This then implies that one of the central questions that we should ask next is what kind of circumstances lead to the growth of a large central black hole (and bulge). I show that the stellar halos of nearby galaxies offer a unique and powerful probe of the growth history of galaxies. Galaxies like the Milky Way have a wide range of stellar halo masses and metallicities. Stellar halo mass and metallicity correlate, in excellent quantitative accord with models in which stellar halos grow by the disruption of satellite galaxies; the stellar halo is indeed an accurate and powerful record of the merger history of a galaxy. I then show that stellar halo mass and bulge/BH mass are very poorly correlated, suggesting that there is no trivial link between galaxy mergers and bulge or black hole growth.