



PHYSICS AND ASTRONOMY SEMINAR

Professor Annalisa Pillepich,

**“The many diverse manifestations of supermassive
black-hole feedback”**

Abstract

Feedback from super massive black holes (SMBHs) is commonly invoked in the largest large-scale cosmological galaxy simulations to halt star formation in massive galaxies. No other mechanism so far has been shown to be capable of reproducing the observed red sequence of simulated massive quenched galaxies that are consistent with the observed red sequence quenched fractions. In this talk, I will leverage the IllustrisTNG cosmological simulations to gain insights and testable predictions on the manifestations of the phenomena. With IllustrisTNG, with one unique set of physical ingredients, we simultaneously resolve and model the inner structural details of thousands of galaxies across five magnitudes in stellar mass, environments, and together with the evolution and dynamics of the interstellar, circumgalactic and intergalactic media. We are putting together ever more quantitative and plausible evidences as to the role that feedback from SMBH can play not only in shaping galaxy structural properties and galaxy populations across 90 per cent of the Universe's history, but also in regulating the thermodynamical, ionization, and chemical enrichment properties of the cosmic gas across halo scales and beyond. I will show how the IllustrisTNG model predicts that the gaseous atmospheres within star-forming galaxies are *key* *brighter* for star-forming than for quiescent galaxies at the transition mass scale of $10^{11} M_{\odot}$. And I will discuss how these results on the observed