

# UniTn Seminar Abstract

*Dr. Massimo Gaspari*

*Dept. of Astrophysical Sciences, Princeton University, NJ, USA*

[mgaspari@astro.princeton.edu](mailto:mgaspari@astro.princeton.edu)

## ***BlackHoleWeather: Raining on Galaxies and Supermassive Black Holes***

Feeding and feedback tied to supermassive black holes (SMBHs) play central role in the cosmic evolution of galaxies, groups, and clusters of galaxies. The self-regulated active galactic nucleus (AGN) cycle is matter of intense debate. I review key results of our theoretical and observational campaign (*BlackHoleWeather*) which aims to unveil how SMBHs are tightly coupled to the multiphase gaseous halos, linking the inner gravitational radius to the cosmological scales (Mpc) and vice versa. Massively parallel hydrodynamical simulations show that the turbulent plasma (X-ray) halo radiatively cools via a top-down multiphase condensation rain of warm (optical/IR) filaments and molecular (radio) clouds. The multiphase precipitation inherits the hot halo kinematics and thermodynamics, thus establishing a “cosmic weather”. In the nuclear region, the recurrent collisions between the clouds and filaments promote angular momentum cancellation and boost the SMBH accretion rate via Chaotic Cold Accretion (CCA). The rapid CCA variability triggers powerful fast AGN outflows that quench the macro-scale cooling flow and star formation, while preserving the atmospheres of galaxies, groups, and clusters in quasi thermal equilibrium throughout cosmic time.

