**AGN winds shaping massive galaxies from cosmic dawn to high noon**

When actively accreting matter, supermassive black holes (SMBHs) in active galactic nuclei (AGN) can launch powerful winds, driving high-velocity outflows that can extend to galactic scales. These broad-line and nuclear winds are powered by radiatively efficient accretion processes, which occur on small scales typically unresolved in large-scale cosmological simulations. To account for this limitation, AGN feedback has traditionally been modelled using subgrid prescriptions, and, in the radiatively efficient regime of SMBHs, most often as continuous thermal energy injection. However, it remains uncertain whether such models can reliably reproduce large-scale gaseous outflows as observed out to redshift $z = 7.5$. As an alternative approach, we developed Mistral, a physically motivated subgrid prescription for modelling AGN-driven winds in the Arepo cosmological code, informed by observations of broad absorption line winds. Mistral is designed to capture the impact of AGN winds on SMBH and galaxy evolution, by modelling the transfer of mass, momentum and energy into the surrounding interstellar and circumgalactic medium.

I will first review the Mistral framework and demonstrate how different AGN feedback implementations affect black hole growth, wind properties, and the evolution of the host galaxy. This comparison will illustrate that Mistral provides a physically motivated approach to modelling AGN winds, and a predictive tool for interpreting the high-redshift galaxy and quasar population now accessible with JWST. Extending this analysis, I will then present results from the Black Dawn suite of cosmological zoom-in simulations, focusing on the 50 most massive galaxies at $z = 3$ selected from the 100 cMpc IllustrisTNG volume. Each system is resimulated using Mistral, the standard TNG AGN feedback model, and without black holes, enabling a controlled study of AGN wind effects on galaxy assembly, star formation, and gas distribution. The simulations reveal that AGN winds drive large-scale outflows whose impact is modulated by the surrounding gas environment. Depending on the interplay between outflow strength and gas supply, these winds can rapidly deplete fuel for star formation. By regulating star formation and shaping the circumgalactic medium, AGN winds produce massive galaxies broadly consistent with JWST-observed quiescent and post-starburst systems, emphasizing their role as key regulators of the baryon cycle from cosmic dawn to high noon.