

## Mapping uncharted territories: AGN feedback at low luminosities and high-z with the ELTs, JWST and SKA. (Vincenzo Mainieri)

Theoretical models of AGN feedback predict that AGN-driven, galaxy wide outflows are a fundamental process affecting the bulk of the baryons in the universe. Hundreds of hours of observations from the ground are being used to characterize such outflows and their impact on the host galaxies using e.g. NIR IFU on 8-10m telescopes to trace the ionized gas or the molecular phase with ALMA. Nevertheless, ground-based IFU observations are limited to wavelengths below  $\sim 2.4$  micron, which implies being able to trace at the same time ionized gas outflows with [OIII] and star-formation with H $\alpha$  only up to  $z \sim 2.3$ . At the same time the current collecting area of ground based telescopes limit the ability to reach the S/N needed to study such outflows in low luminosity AGN and to trace the outskirts of the galaxies. Both limitations will be superseded in the future. The IFU mode on NIRSpec will be able to move these studies to significantly earlier cosmic epochs, up to  $z \sim 6$ . While IFU on the new ELTs, thanks to the large collecting area of the primary and the assistance of AO to reach the diffraction limit, will allow to trace these winds down to very low luminosities and trace the impact that they may have in the turbulent ISM of high- $z$  galaxies.

I will review our current understanding of this possible important phenomena for galaxy evolution and outline the instruments and surveys needed with JWST, the ELTs and SKA to move forward.

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