Contribution ID: **112** Type: **not specified**

The promise of WST for Cosmology

Wednesday 12 March 2025 09:55 (20 minutes)

Understanding the nature of cosmic acceleration and dark energy remains one of the most profound challenges in modern cosmology. To address these mysteries, upcoming large-scale spectroscopic surveys aim to map the three-dimensional distribution of millions of galaxies across vast cosmic volumes and look-back times. As the most powerful next-generation spectroscopic facility, the Wide-field Spectroscopic Telescope (WST) will revolutionize cosmology by dramatically increasing the number of measured galaxy redshifts. WST will probe the growth of structure and cosmic expansion history through redshift-space distortions and baryon acoustic oscillations, while also testing models of inflation by detecting non-Gaussianity on the largest scales. The primary WST legacy survey will target galaxy tracers up to redshift ⍰ 1.6, where dark energy effects become prominent. Additionally, higher-redshift surveys will push measurements of cosmic expansion and structure growth to 2<z<5, with extensions to z 7 via Lyman-alpha emitters. Beyond its role in tracing cosmic evolution, WST will enable precise constraints on neutrino mass, improve limits on non-Gaussianity by an order of magnitude over current experiments, and refine our understanding of multi-field inflation scenarios. Moreover, its capabilities will support complementary studies, including Lyman-alpha forest correlations to probe dark matter properties, intrinsic galaxy alignments for weak lensing corrections, and spectroscopic follow-up of gravitational wave and fast radio burst sources to enhance cosmological distance measurements. With its unprecedented combination of survey depth, spectral resolution, and versatility, WST stands poised to transform our understanding of the cosmos.

Authors: Dr CARBONE, Carmelita (INAF IASF-MI); MORESCO, Michele

Presenters: Dr CARBONE, Carmelita (INAF IASF-MI); MORESCO, Michele

Session Classification: Cosmology and fundamental physics