Contribution ID: **100** Type: **not specified**

Exploring Star Formation Histories in Local Group Galaxies: A Deeper Perspective with the WST

Tuesday 11 March 2025 12:25 (15 minutes)

The star formation histories (SFHs) in Local Group dwarf galaxies give essential insights into their evolution and interaction with the environment that help us understand their role into the formation of large structures. Resolved stellar populations, analyzed through the synthetic Color-Magnitude Diagram (CMD) method, have been pivotal in reconstructing detailed SFHs. The Wide Spectroscopic Telescope (WST), with its unique combination of high multiplexing capability, wide field of view, and spectral resolution will have the ability to survey Local Group dwarf galaxies beyond the Milky Way's virial radius in systems previously inaccessible to detailed study. WST will deliver precise chemical abundances and kinematic information for millions of stars that will allow the calibration of key SFH indicators, such as age-sensitive abundance ratios ("chemical clocks"), the frequency of binary systems in different environments, while providing detailed chemical inventories for diverse stellar populations.

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Session Classification: Variable objects and their role as tracers of galaxy structure and evolution