## Seventeenth Marcel Grossmann Meeting



Contribution ID: 405

Type: Talk in a parallel session

## Cosmic clocks and cosmic chronometers: constraining the Hubble parameter now and then

Friday, 12 July 2024 15:30 (20 minutes)

Constraining the expansion history of the Universe with new and complementary approaches is crucial now that we are in the age of precision cosmology, where managing systematic effects and increasing the accuracy of the measurements is essential.

In this talk, I will present how the ages of the oldest objects in our Universe can shed light on its expansion history, both in the local Universe and at high redshift. At z=0, we analyse the ages of the oldest globular clusters, which naturally place a lower limit on the current age of the Universe and, in turn, an upper limit on  $H_0$ . In our work, we study a sample of globular clusters in the Milky Way, deriving their physical properties via full-spectrum-fitting (FSF). They show estimations of cluster masses and metallicities [Z/H] that align very well with literature values, along with slightly higher age estimates. We complement FSF with the analysis of relevant spectral indices, that prove to be useful diagnostics in identifying spurious solutions. In the end, selecting the tail of oldest objects of our sample, we can obtain an upper limit on  $H_0$ .

At higher redshift, we benefit from the quality of the VLT/MUSE spectroscopic data and analyse spectra and photometry of a selected sample of massive and passive galaxies at high S/N, deriving their physical properties via FSF. We then apply the cosmic chronometers method, and from the analysis of their differential ageing in redshift, we derive a new, cosmology-independent, measurement of the Hubble parameter at  $z\sim0.55$ , taking into account both statistic and systematic effects.

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**Session Classification:** Current status of the H\_0 and growth tensions: theoretical models and modelindependent constraints

**Track Classification:** Cosmic Microwave Background, Cosmological Tensions (CM): Current Status of the H\_0 and growth tensions: theoretical models and model-independent constraints