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

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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$\sim$0.55, 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 model-independent constraints

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