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Mapping dark energy with fundamental couplings

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We recently extended Principal Component Analysis based methods to constrain the dark energy equation of state (originally developed for Type Ia supernovae and other low redshift probes) to spectroscopic tests of the stability of fundamental couplings, which can probe higher redshifts. In this talk I will use these methods to quantify the gains in sensitivity obtained by combining spectroscopic measurements expected from ESPRESSO at the VLT and the high-resolution ultra-stable spectrograph for the E-ELT (known as ELT-HIRES) with future supernova surveys. I will also discuss the dark energy impact of supernovas beyond the acceleration phase (i.e., deep in the matter era), and show how the dark universe may be mapped as deep as redshift 4.

Presenter: LEITE, Ana Caterina (Centro de Astrofísica da Universidade do Porto, Portugal)

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