

Testing fundamental physics with HRMOS spectra of solar twin stars

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I will present a new probe of possible variations in the fine-structure constant on Galactic size-scales: solar twins and analogues. This method has been demonstrated on local solar twin spectra from ESO HARPS. We have also recently discovered much more distant solar twins, 4kpc closer to our Galaxy's centre, where the dark matter density is 3 times higher than the local environment. ESPRESSO on the VLT offers the opportunity to observe these distant twins to probe any connection between the dark sector and variations in the constants of nature beyond the Standard Model of particle physics. HRMOS's multiplex advantage over ~25 arcmin scales promises a highly efficient means to gain an order of magnitude in precision, down to the ~20 parts-per-billion level – a truly stringent test of fundamental physics and probe of new physics.

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