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Quasars and intergalactic medium: QUBRICS and ESPRESSO results on the cosmic ionizing background and the Sandage test of redshift drift

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Studying the absorption lines along the lines of sight to bright high- z QSOs is an invaluable cosmological tool, providing insight into the intergalactic/circumgalactic medium, dark matter, big-bang nucleosynthesis and general relativity. I report here the recent results of the QUBRICS (QUasars as BRiGht beacons for Cosmology in the Southern hemisphere) survey and high-resolution spectroscopy with the ESPRESSO high-fidelity spectrograph, the lessons learned and the synergies (particularly in terms of Machine Learning and new instrumentation for future 30m-class telescopes) and implications for the cosmic UV background, reionization, small-scale structure and the Sandage test of the cosmic redshift drift.

Presenter: CRISTIANI, Stefano

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