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High precision spectroscopy of Ps.

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Positronium is an excellent test-bed for bound-state QED, owing to its purely leptonic nature. This allows its properties to be calculated very precisely in terms of the fine structure constant, with no contributions from hadronic interactions (weak interactions can also be neglected at the present experimental level). In addition to probing QED, a sufficiently precise measurement of the 1S-2S transition frequency (at the level of a few kHz) can also provide a model-independent limit on the effect of gravity on antimatter, revealed through seasonal variation (or lack thereof) as a result of the change in gravitational potential between peri- and aphelion. Progress towards such a measurement is reported here, including preliminary results, positron beam technology and strategies for reaching the required precision.

Author: COOKE, David (Eth Zurich)

Co-author: CRIVELLI, Paolo (Eidgenoessische Tech. Hochschule Zuerich (CH))

Presenter: COOKE, David (Eth Zurich)

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