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The Heartbeat of Light

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For three decades, precision spectroscopy of the simple hydrogen atom has motivated advances in laser spectroscopy and optical frequency metrology. Recently, femtosecond laser optical frequency comb synthesizers have arrived as revolutionary tools for ultraprecise optical spectroscopy. A new absolute frequency measurement of the hydrogen 1S-2S two-photon resonance sets upper limits for possible slow variations of the time structure constant α . Frequency comb techniques are also making it possible to control the electric field of ultrafast laser pulses, opening intriguing opportunities in attosecond physics.