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Laser Spectroscopy of Trapped Ions

Absolute frequency measurement of the $^2S_{1/2} \rightarrow {}^2F_{7/2}$ optical clock transition in $^{171}Yb^+$ with an uncertainty of 4×10^{-16} using a frequency link to international atomic time

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Abstract

The highly forbidden 2S1/2→2F7/2 electric octupole transition in 171Yb+ is a potential candidate for a redefinition of the SI second. We present a measurement of the absolute frequency of this optical transition, performed using a frequency link to International Atomic Time to provide traceability to the SI second. The 171Yb+ optical frequency standard was operated for 76% of a 25-day period, with the absolute frequency measured to be 642 121 496 772 645.14(26) Hz. The fractional uncertainty of 4.0×10-16 is comparable to that of the best previously reported measurement, which was made by a direct comparison to local caesium primary frequency standards.

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Notes

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Additional information

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