

Testing Optical Clock Calibration Procedures: Absolute Frequency Measurement of Rubidium 5S-7S Two-Photon Transitions

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We report the absolute frequency measurements of rubidium 5S-7S two-photon transitions with an optical frequency comb. The digital lock to the transition, the procedures of evaluating the accuracy budget and measurements of the frequency with the optical frequency comb, which are prepared for the system of two optical lattice clocks with strontium atoms, are tested with much simpler setup. The narrow 760-nm Rb 5S–7S two-photon transitions, insensitive to a magnetic field, are particularly interesting as a frequency standard. The similar line, the 778-nm Rb 5S–5D transition has been recommended as the realization of the SI length unit meter [1]. As a result of this test, we obtained higher accuracy of the transition measurement than any previously reported [2] thanks to the very good long term stability of our experimental setup.

References:

- [1] Bureau International des Poids et Mesures (BIPM), in Report of the 86th Meeting of the Comité International des Poids et Mesures (CIPM), (BIPM, Sèvres, France, 1997).
[2] Ming-Sheng Ko and Yi-Wei Liu, *Opt. Lett.*, **29**, 1799 (2004), A. Marian et al., *Phys. Rev. Lett.* **95**, 023001 (2005), K. Pandey et al., *Opt. Lett.*, **33**, 1675 (2008)