Progress on Compact Setup of Thulium Optical Lattice Clock

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Neutral thulium atoms are interesting for building an optical clock [1] and quantum simulator [2]. Here we present our result on laser cooling, trapping and spectroscopy of thulium atoms in a compact vacuum setup. In a vacuum volume of less than 5 litres, we load up to 13 million atoms into a magneto-optical trap directly from the atomic oven. After second-stage laser cooling, we transfer more than 50% atoms into an optical lattice at a near-to-magic wavelength of 1064 nm, which is formed using an in-vacuum enhancement cavity. We have demonstrated optical pumping to $m_F = 0$ level and high-resolution spectroscopy of a 1.14 µm clock transition.

References

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