Microfabricated vapor cell atomic clocks at FEMTO-ST

Clément Carlé[1], Martin Callejo[1], Andrei Mursa[1], Moustafa Abdel Hafiz[1], Quentin Tanguy[1], Rémy Vicarini[1], Jacques Millo[1], Vincent Maurice[2], Emmanuel Klinger[1], Nicolas Passilly[1], Rodolphe Boudot[1]

[1] FEMTO-ST, CNRS, Université de Franche-Comté, ENSMM, Besançon, France
[2] IEMN, Univ. Lille, CNRS, Centrale Lille, Université Polytechnique Hauts de France, Lille, France

The convergence of atomic spectroscopy, MEMS cell technologies and integrated photonics has led to the deployment of high-precision chip-scale atomic devices [1]. In this talk, we will present in-progress studies at FEMTO-ST Institute, France, for the development of microcell-based microwave and optical atomic clocks, with enhanced stability performances.
In the first part, we will talk about the demonstration of CPT-based microwave cell clocks with stability at 1 day in the low 10^{-12} range [2], made possible thanks to the combination of advanced Ramsey-based interrogation sequences [3] and cells built with low gas permeation windows [4-5].
In the second part, we will discuss the in-progress development of a microcell-based optical frequency reference based on the two-photon transition of Rb atom at 778 nm. An encouraging short-term stability of 3×10^{-13} at 1 s and 3×10^{-14} at 100 s has been recently achieved [6]. Future studies will be briefly discussed.

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