

Impact of vapour cell design on long-term stability of compact atomic clocks

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We discuss the design considerations applying to vapour cells used in high-performance Rb atomic clocks, in view of low sensitivity to environmental parameter fluctuation, thus enabling state of the art long-term clock stability from a simple and compact device. In particular we will discuss the temperature sensitivity of the Rb hyperfine clock transition in the cell, as well as its sensitivity to environmental pressure fluctuations. The impact of the cell properties on the long-term clock stability will be quantified, and analysed with respect to experimentally measured clock stability data [1].

[1] N. Almat, M. Gharavipour, W. Moreno, F. Gruet, C. Affolderbach, G. Mileti, Long-Term Stability Analysis Toward $< 10^{-14}$ Level for a Highly Compact POP Rb Cell Atomic Clock, IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control 67(1), 207 – 216 (2020).