

## Miniature Trapped Ion Optical Clock

**Supervisor:** Yann Kersalé (Oscillators, Clocks, Metrology and Systems group leader, Time and Frequency Department of the FEMTO-ST institute in Besançon)

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**Contact:** [clement.lacroute@femto-st.fr](mailto:clement.lacroute@femto-st.fr)

### **Summary:**

The PhD will be dedicated to the realization of an Yb<sup>+</sup> optical clock, within the Time and Frequency department at the FEMTO-ST Institute, in Besançon. The OHMS team (Oscillators, Clocks, Metrology and Systems) develops ultra-stable oscillators (Fabry Perot cavities, cryogenic sapphire oscillators...) as well as atomic clock (Cs cell clocks, Yb<sup>+</sup> ion clock). The successful candidate will join a group of experts in the fields of time and frequency metrology, lasers, and atom cooling and trapping.

The overall goal of the project is the development of a compact optical atomic clock based on single, trapped Yb<sup>+</sup> ions. The targeted volume is of order 100 L., with a targeted stability of 10<sup>-14</sup> at 1 second integration time, ten times better than today's best compact atomic clocks. The ions will be laser-cooled and trapped by a micro-fabricated, surface-electrodes trap. The objectives of the PhD thesis will be the experimental realization of the clock, with a focus on the clock laser and the design of a compact vacuum chamber. The ion trap will be micro-fabricated using MEMS technologies in the nearby MIMENTO cleanroom facility. The optical setup will make use of fibered components whenever possible, so as to reduce the overall volume. Once the setup will be running, the main experimental results will be the spectroscopy of the clock transition and a first study of the clock frequency stability.

### **For additional information, please visit our webpages:**

Project webpage: <http://projects.femto-st.fr/miticc/>

Group webpage: <http://teams.femto-st.fr/equipe-ohms/>