

Towards Optical Clocks and Coherent Frequency Transfer in Sweden

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Within SPs commitment as a National Metrology Institute (NMI), a research program towards optical clocks and coherent frequency transfer are being initialized. With the aid from Swedish Post and Telecom Authority (PTS), we have recently been able to equip a new laboratory with an optical frequency comb and an ultra-stable laser from Menlo Systems.

With this equipment as a foundation, SP are now working towards the construction of an optical lattice clock based on strontium atoms, see figure 1 for a schematically illustration of the planned system. The system will be built with a modular design with the aim of being robust and easy to upgrade. The hope is that the system will be a future Swedish frequency reference and a stable frequency source for frequency transfers over optical fiber.

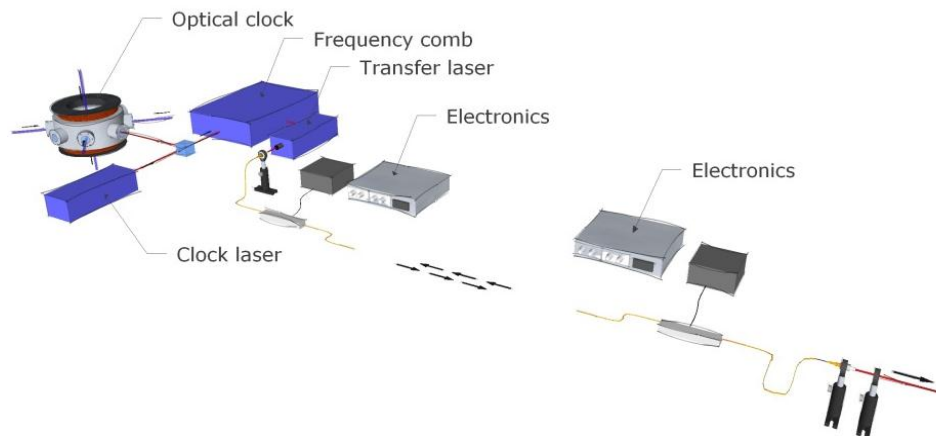


Figure 1. Schematic illustration of the planned experimental system. The robust optical lattice clock is intended to act as a future Swedish reference for optical frequencies and be the source for research and development within coherent frequency transfers over optical fibers.

For the frequency transfer the plan is to use a diode-laser, which will be locked to, and narrowed by the clock laser through the frequency comb. Even without a fully operational optical clock, the clock laser and the frequency comb will allow for testing frequency transfer methods way below the 10^{-13} level.

With this poster presentation, we will present the research program in more detail, the current status, and our future plans within the field.