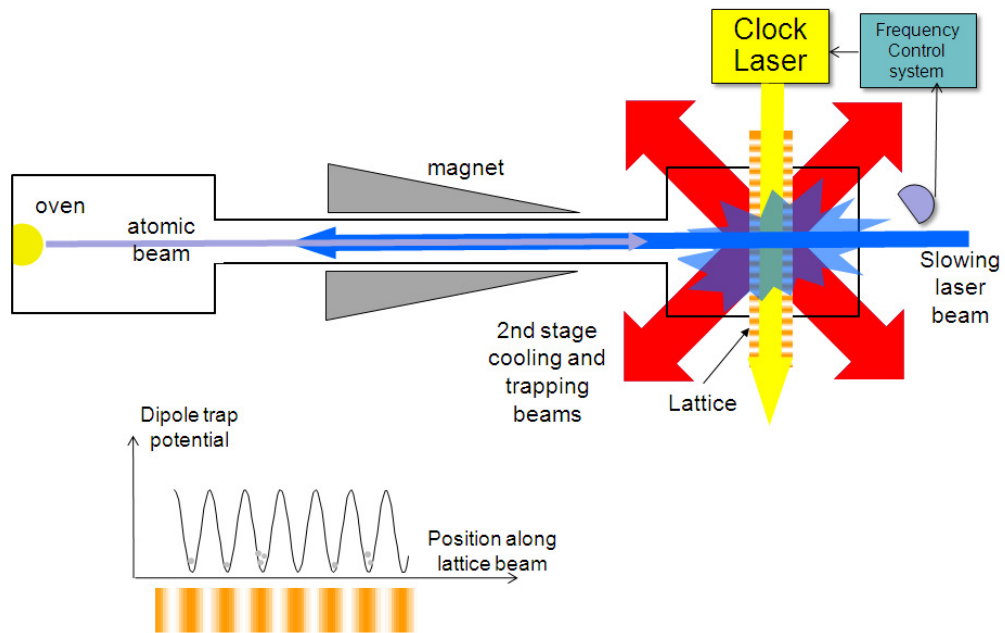
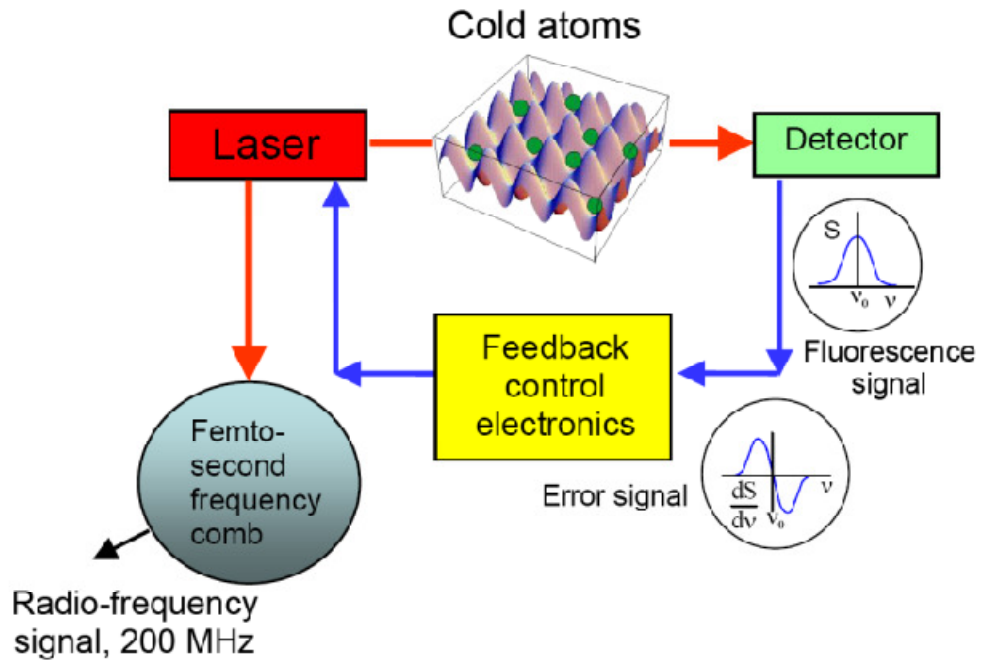
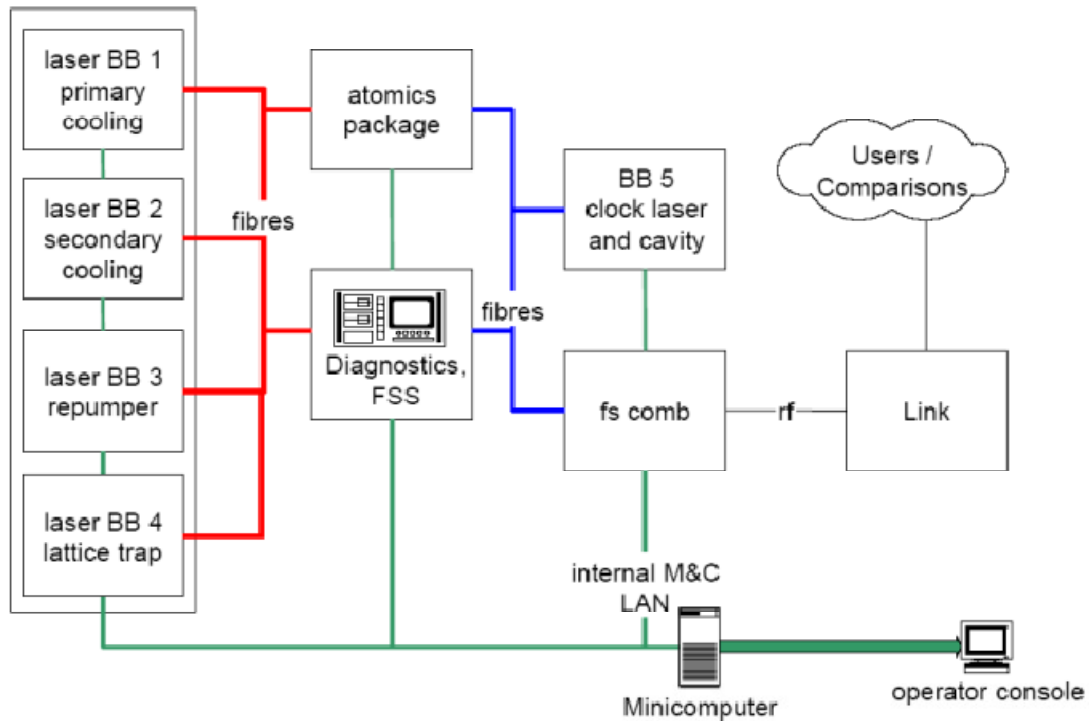


# The Space Optical Clocks





*" All images used are for illustrative purposes only. The material available on this website is provided for general information and education purposes only. All images are copyrighted by their respective owners "*

The use of ultra-precise optical clocks in space ("master clocks") will allow for a range of new applications in the fields of fundamental physics (tests of Einstein's theory of General Relativity, time and frequency metrology by means of the comparison of distant terrestrial clocks), geophysics (mapping of the gravitational potential of Earth), and astronomy (providing local oscillators for radio ranging and interferometry in space). The "Space Optical Clocks" project aims to install and to operate an optical lattice clock on the ISS towards the end of this decade, as a natural follow-on, improving its performance by at least one order of magnitude. The payload is planned to include an optical lattice clock, as well as a frequency comb, a microwave link, and an optical link for comparisons of the ISS clock with ground clocks located in several countries and continents. Undertaking a necessary step towards optical clocks in space this project aims at two "engineering confidence", accurate transportable lattice optical clock demonstrators having relative frequency instability below  $1 \times 10^{-15}$  at 1 s integration time and relative inaccuracy below  $5 \times 10^{-17}$ . This goal performance is about 2 and 1 orders better in instability and inaccuracy, respectively, than today's best transportable clocks. The devices will be based on trapped neutral ytterbium and strontium atoms. One device will be a breadboard. The two systems will be validated in laboratory environments and their performance will be established by comparison with laboratory optical clocks and primary frequency standards. In this paper will present the project and the results achieved during the first year.

For Additional Information please contact [info@technologyconcepts.in](mailto:info@technologyconcepts.in)