Aiming at an ultimate clock
Development of a Sr/Yb optical lattice clock

An optical lattice clock is one of the promising candidates for the next generation "SI" second. We developed an Yb optical lattice clock in 2009. The uncertainty of our Yb lattice clock will soon be limited by our cesium fountain clock. In 2009, we therefore started a new project on Sr/Yb dual optical lattice clock project. In this project we aimed to realize an optical lattice clock of Sr and Yb using the same vacuum chamber and to measure the clock transition frequency ratio with unprecedented precision. We believe that this project will strongly support the redefinition of the second using an optical lattice clock scheme.

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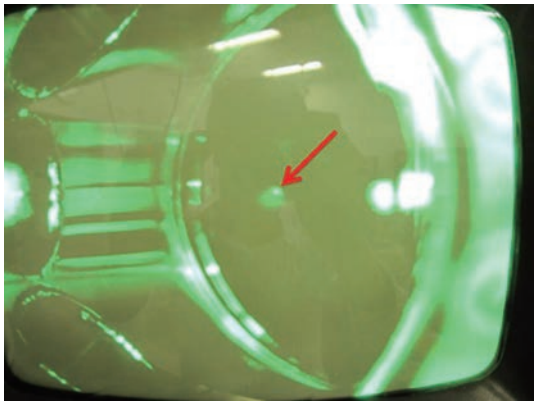

Magneto-optically trapped Sr atoms

A compact system generating high-precision electric field
Electric field standards using a waveguide

We are doing research on standard electric field (*E*-field) generation using waveguides. An electrical device should not be influenced by unexpected electromagnetic fields. Ordinary electromagnetic interference tests require uniform *E*-field illumination to the device under test. The *E*-field strength applied to the device should be sufficiently reliable for safety and a field probe employed for the measurements should be properly calibrated against the standard *E*-field strength. Although the standard field generation in an anechoic chamber has an advantage in the frequency band, that in a transverse electromagnetic (TEM) waveguide is still more useful in terms of compactness. In addition to this, generating a strong field in the TEM waveguide requires an amplifier with significant lower gain compared with that in an anechoic chamber.

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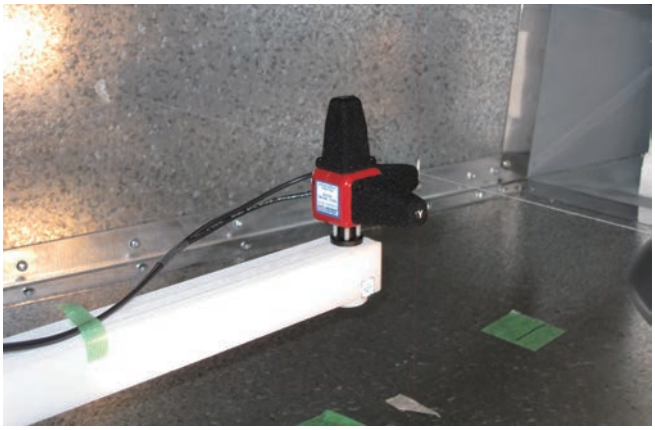

Standard electric field generation using a waveguide