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## **Robust Yb optical lattice clock for contributing to International Atomic Time**

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### **Abstract**

Recent rapid progress of the optical frequency standards motivates the discussion on the redefinition of the SI second, which is presently defined by fixing the cesium microwave frequency value. The Consultative Committee for Time and Frequency (CCTF) set mandatory conditions which must be fulfilled before the redefinition. One of the most difficult conditions is the regular contribution of the optical frequency standards to the International Atomic Time (TAI), whose fulfilment index is less than 20 % in 2021. We will present our research activities on a robust ytterbium (Yb) optical lattice clock aiming for the highest uptime for continuous operation. We implemented a laser frequency relocking system fully utilizing our fiber-based optical frequency combs. A remote monitoring system allows an unattained operation of the clock. Thanks to these innovations, almost continuous operation of the clock with e.g., an uptime of 94.5 % for 30 days was made possible. After the verification by CCTF Working Group on Primary and Secondary Frequency Standards, we conduct on-time calibration of TAI 11 times in 2021 and 2022. The most recent calibrations utilize an improved gravitational redshift determined by a precise leveling and local gravity measurement by Geospatial Information Authority of Japan.