Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Cost-effective magneto-optical trap of ytterbium atoms CHANG YONG PARK, WON-KYU LEE, DAI-HYUK YU, HO SUHNG SUH, SANG EON PARK, EOK BONG KIM, Korea Research Institute of Standards and Science, QUANTUM APPLICATION SI LAB. TEAM — We report on a cost-effective magneto-optical trap (MOT) of ytterbium atoms by using diode lasers as a previous step for an optical lattice clock. For the purpose of MOT, we have specially designed GaN external cavity laser diodes (ECLD), which outputs 10 mW at a wavelength of 399 nm. One of the ECLD is used to trap the ytterbium atoms along x-axis, while additional F-P diode lasers, which is injection locked to the previous ECLD, is used for the trapping along y and z axes. These trapping lasers are frequency stabilized to Doppler free $^1S_0 - ^1P_1$ transition. We have trapped 5×10^6 atoms for ^{174}Yb and 2×10^6 atoms for ^{171}Yb respectably at a trapping temperature of 1 mK, which is still too high for settling the atoms inside the optical lattice. In order to further decrease the trapping temperature an additional cooling laser is necessary corresponding to $^1S_0 - ^3P_1$ transition with which ytterbium atoms can be cooled to 4 μK. To obtain the desired laser, 1112 nm ECLD with 200 mW output is frequency doubled through MgO doped PPLN waveguide.

Chang Yong Park
Korea Research Institute of Standards and Science

Date submitted: 01 Feb 2007 Electronic form version 1.4