Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

Development of Thermal Ionizer for the Search of the Electron Electric Dipole Moment TOMOHIRO HAYAMIZU, AKIHITO OIKAWA, TOSHIYA TAKAHASHI, HIDETOMO YOSHIDA, MASATOSHI ITOH, YASUHIRO SAKEMI, CYRIC, Tohoku University — A non-zero Electric Dipole Moment (EDM) of an elementary particle means the violation of the time-reversal symmetry and the CP violation assuming the CPT invariance. The super symmetry model (SUSY) predicts the EDM large enough to be observed with the modern experimental technique. In alkali atoms, an electron EDM results in an atomic EDM enhanced by the factor $\sim Z^3\alpha^2$, especially francium (Fr) has the largest enhancement factor $\sim$ 1150. However Fr is a radioactive atom with a finite life time, we need to establish the technique to produce over 10^7 atoms/sec, cool and collect them quickly into laser trap apparatus as a cold dense cloud of neutral atoms to measure the EDM accurately. Thermal Ionizer produce the high intensity Fr ion using a fusion reaction of $^{18}O+^{197}Au\rightarrow^{210}Fr+5n$ with a primary beam energy E_O^{18} $\sim$100 MeV. This ionizer consists of the Au target surrounded by the high temperature oven to stop the ion spreading out. Thanks to the small extraction electrode hole, we can realize the small emittance Fr beam, and the high transmission efficiency. We have achieved to produce over $\sim 10^4$ atom/sec, and transport them along 3 meter without losing the Fr ions.

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Date submitted: 31 Jul 2009 Electronic form version 1.4