Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

Performance of an active nuclear spin maser with double-cell geometry SHUICHIRO KOJIMA, TOMOYA SATO, Tokyo Tech, YUICHI ICHIKAWA, RIKEN Nishina Center, YUICHI OHTOMO, YU SAKAMOTO, CHIKAKO FUNAYAMA, TAKAHIRO SUZUKI, MASATOSHI CHIKAMORI, ERI HIKOTA, MASATO TSUCHIYA, Tokyo Tech, TAKESHI FURUKAWA, Tokyo Metropolitan Univ., AKIHIRO YOSHIMI, Okayama Univ., CHRISTOPHER BIDINOSTI, Univ. of Winnipeg, TAKASHI INO, KEK, HIDEKI UENO, RIKEN Nishina Center, YUKARI MATSUO, Hosei Univ., TAKESHI FUKUYAMA, RCNP, Osaka Univ., KOICHIRO ASAHI, Tokyo Tech — A permanent electric dipole moment (EDM) violates T-invariance and, through the CPT theorem, its magnitude sets limits on CP-violation phases beyond the Standard Model. We aim to search for an EDM in ^{129}Xe beyond the present upper limit at the level of $10^{-28}e$cm. We use an active nuclear spin maser in order to achieve a precession frequency precision of 1 nHz in an applied electric field of 10 kV/cm. A co-magnetometer using ^{3}He and a double-cell geometry have been incorporated into our setup in order to reduce systematic uncertainties. The Rb polarization causes shifts in the frequencies for ^{129}Xe and ^{3}He precession. The frequency shift for ^{129}Xe cannot be canceled out by this type of co-magnetometer because the ^{129}Xe-Rb coupling differs significantly from that of ^{3}He-Rb one. We found that in the double-cell geometry, the dominant contribution to the frequency shift from the Rb polarization occurs in the pumping cell We attempt to clarify the mechanism and to reduce the frequency shift.

Shuichiro Kojima
Tokyo Tech

Date submitted: 24 Jun 2014 Electronic form version 1.4