Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

**Feasibility study to search for the rare $\gamma$-decay mode in $^{12}$C**
MIHO TSUMURA, TAKAHIRO KAWABATA, SATOSHI ADACHI, TATSUO BABA, TATSUYA FURUNO, YUKI ISHII, MOTOKI MURATA, Kyoto University, ATSUSHI TAMII, TAKASHI HASHIMOTO, KICHIJI HATANAKA, YOHEI MATSUDA, KENJIRO MIKI, CHIHIRO IWAMOTO, TAKESHI ITO, MASAKI MIURA, Research Center for Nuclear Physics, Osaka University, JUZO ZENIHIRO, SHIGERU KUBONO, RIKEN, MASATOSHI ITOH, SHUN ANDO, Cyclotron and Radioisotope Center, Tohoku University, YUKIE MAEDA, Miyazaki University, SATOSHI SAKAGUCHI, Kyushu University, HIDETOSHI AKIMUNE, Konan University, HISAKO FUJIMURA, Wakayama University, IWA OU, Okayama University, RCNP E404 COLLABORATION — The triple $\alpha$ reaction plays a very important role in the $^{12}$C synthesis in the universe. Gamma-decay widths of excited states in $^{12}$C are the key parameters to determine the triple $\alpha$ reaction rate. The triple $\alpha$ process proceeds via the $0_2^+$ state (Hoyle state) at normal stellar temperature. However, at high temperature $T_9$ >1, the highly excited states such as the $3_1^-$ and $2_2^+$ states become dominant. Unfortunately, the $\gamma$-decay widths of these states are still unknown. We proposed to measure the $^1$H($^{12}$C, $^{12}$Cp) reaction to determine the radiative widths of the highly excited states in $^{12}$C. Recoil protons will be measured in coincidence with scattered $^{12}$C instead of $\gamma$-rays. The test experiment was carried out at the cyclotron facility in RCNP. In the present talk, we will report this result.

Miho Tsumura
Kyoto University

Date submitted: 26 Jun 2014 Electronic form version 1.4