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Acceleration-deceleration system and pre-buncher system for high-intensity ^{12}C pulsed beam YOSHIHIRO NARIKIYO, KENSHI SAGARA, KUNIHIRO FUJITA, HIROYUKI YAMAGUCHI, KENNICHI HAMAMOTO, TADAHIKO BAN, NARIAKI TAO, LEII KAKU, Department of Physics, Kyushu University — In Kyushu University, the measurement of the cross section $^{12}\text{C} + \alpha \rightarrow ^{16}\text{O} + \gamma$ has been planned for astrophysical interest. To perform a high efficiency measurement, an inverse kinematics was employed. Since the cross section at near stellar energy ($E_{\text{c.m.}} = 0.7\text{MeV}$) is extremely small, a few pb, it is of importance to increase the beam intensity. In this study, two improvements were performed. The former is an improvement of the tandem accelerator. Since our accelerator was designed for higher voltage (6–10MV), the transmission efficiency in our experiment (1–2MV) is poor (12.8%). We developed a novel accelerating method called accele-decel mode. Shorting bars were installed on the tube to make a series of acceleration and deceleration sections, which derive a strong focusing effect. Consequently the beam emittance becomes smaller by a factor of two. The latter is an upgrading a beam pulsing instrument. Although the pulsed beam is necessary for background reduction in our experiment, low conversion efficiency of DC to pulsed beam cause a decrease of the intensity to be 28%. To increase the efficiency, we introduced a pre-buncher system, and attained it to be 63%. These improvements increased the beam intensity by a factor of four, and enable to measure the cross section at $E_{\text{c.m.}} = 1.2\text{MeV}$.

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