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Beta-decay of proton-rich ^{31}Cl and its relevance for explosive H-burning[1] L. TRACHE, A. BANU, J.C. HARDY, V.E. IACOB, M. MCCLESKEY, B. ROEDER, E. SIMMONS, G. TABACARU, R.E. TRIBBLE, Texas A&M University, T. DAVINSON, G. LOTAY, P.J. WOODS, University of Edinburgh, UK, A. SAASTAMOINEN, A. JOKINEN, J. AYSTO, University of Jyvaskyla, Finland
— We produced and separated proton-rich nucleus ^{31}Cl with the MARS recoil separator at TAMU. Then studied its beta-gamma and beta-delayed proton-decay using techniques designed for low-intensity, short-lived sources. The states populated in the daughter nucleus ^{31}S above the proton threshold at S_p=6133 keV are resonances in the proton capture reaction ^{30}P(p,γ)^{31}S, crucially important for the explosive H-burning novae. The setup consisted of a telescope made of a thin double sided Si strip detector (p-detector) BB2-45 and a thick Si detector (β-detector). A HpGe detector outside the chamber detected γ-rays. The source nuclei produced at about 32 MeV/u were slowed down and implanted in the middle of the thin Si strip detector. The technique allowed us to measure very low proton energies (down to 2-300 keV), has shown a remarkable selectivity to β-delayed charged particle emission, and would work even at radioactive beam rates of a few pps. Furthermore, the half-life of ^{31}Cl was measured with under 1% accuracy, its Isobar Analog State was located and from IMME its mass excess better determined.

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