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Multi-particle emission from 31Ar at IDS

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In the beta decay of exotic nuclei, far from stability, the daughter nuclei might be formed in an excited state, which is unstable against particle emission. This phenomenon is called β-delayed particle emission and is due to a high Q-value and low separation energy for particle emission. The decay of the proton drip-line nucleus ^{31}Ar is one of the most exotic β-delayed multi-particle decays. It has a large Q-window and as a consequence many different β-delayed decay channels are open: βγ, βp, βpγ, β2p, β2pγ, β3p and perhaps also β3pγ [1].

<p>The aim of the IS577 experiment performed at the ISOLDE Decay Station (IDS) was the identification of the β3p and β3pγ-decays in ^{31}Ar as well as to provide important information on the resonances of ^{30}S and ^{29}P, relevant for the astrophysical rp-process [2].<p>The IDS is a new installation at ISOLDE devoted to β-decay measurements. This is the first time that one of these kind of experiments based on decay studies is carried out taking advantage of this permanent station. Our collaboration installed a new implantation chamber; the MAGISOL Si-Plugin Chamber, consisting in 5 Double Sided Si Strip Detectors (DSSSD) backed by un-segmented Si-pad detectors in ΔE-E telescope configuration. In addition, there are 4 HPGe clover-detectors surrounding the chamber for gamma detection. This setup is compact with high efficiency for both multi-particle emission and gamma ray detection with low cutoff energy as well.The Si-array detects multi proton emission over a wide energy range with the good energy (25 KeV) and angular (3^o) resolution that are needed to characterize the different p-channels of ^{31}Ar. Further, with this setup it is possible to measure proton-gamma and proton-proton coincidences, therefore, we can see gamma transitions from levels of ^{30}S and ^{29}P and determine the spin of levels of ^{30}S and ^{31}Cl, respectively. I will present here preliminary results, as one-proton-gated gamma spectrum and proton-proton angular correlations. [1] Proposal to the ISOLDE and Neutron ToF Committee, INTC-P-386, September 2013 [2] G.T. Koldste et al. Phys. Letters B 737 (2014) 383-387.

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