Study of ^{18}Ne Structure by ^{14}O+Alpha Elastic Resonance Reaction

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It is well known that at high temperature the $^{14}O(\alpha,p)^{17}F(p,\gamma)^{18}Ne(\alpha,p)^{21}Na$ reaction sequence can provide a path into rp-process [1]. Therefore reactions involving ^{14}O are important to understand astrophysical processes. Simultaneously data on α cluster structure in N≠Z nuclei are very scarce, and the recent work [2] showed unusual features of α cluster states in these nuclei. To pursue these aims, we obtained a rather intensive beam of ^{14}O (up to 10^6 pps) in the energy range 40-80 MeV using resonances in the ^{14}N+p interaction [3] and MARS facilities [4]. The purity of the ^{14}O beam was better than 99%. The α-^{14}O resonance interaction was studied using Thick Target Inverse Kinematics (TTIK) method [5]. The time of flight method, providing for the possibility of detecting of low energy particles, was used to identify reaction products. However beam contaminations by ^{7}Be and ^{4}He at the level of 10^{-2}-10^{-4} contaminated small angle data. The light from a thin scintillation foil positioned before the entrance to the scattering chamber (Fig.1) was used as a start signal for the time of flight analysis and also its amplitude was analyzed to inhibit the contaminations.

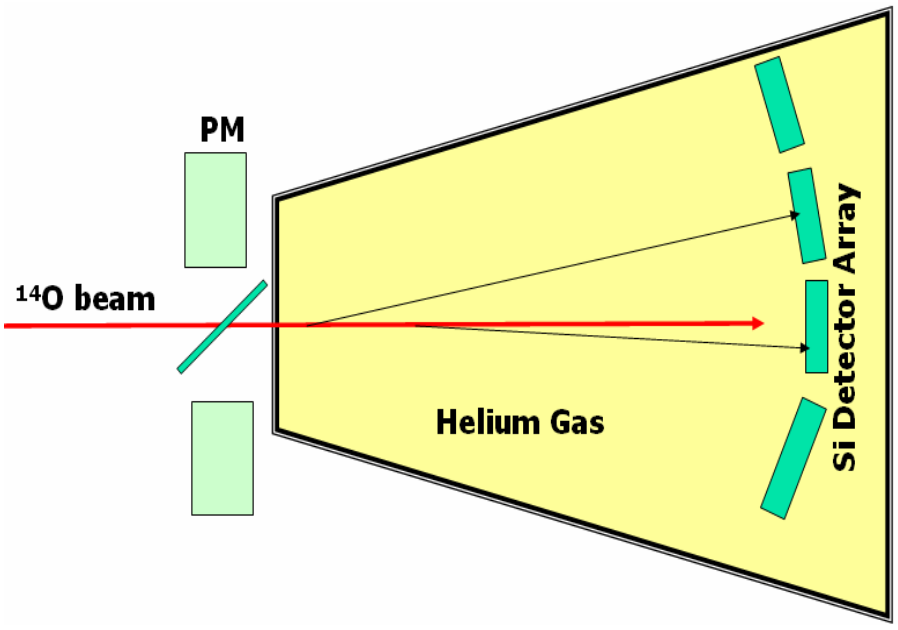

Figure 1. The setup of the experiment

Figures 2 and 3 present two dimensional E-t spectrum and a projection of the α particle banana onto energy axis for an one of 16 Si detectors. The analysis of the results is in progress.

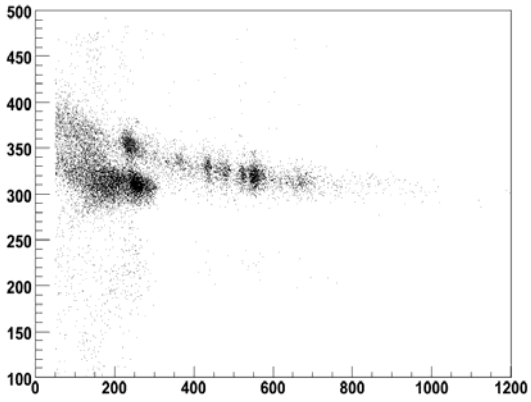

Figure 2. TOF-E spectrum.

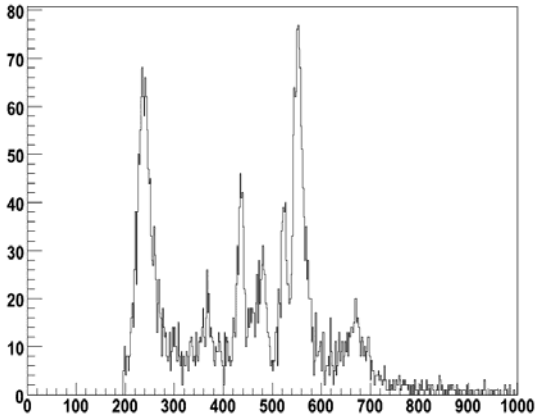

Figure 3. Energy spectrum of alpha particles.

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