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CRYOGENIC GAS STOPPING CELL WARM TESTS WITH 223RA ALPHA SOURCE

The modern high precision experiments in the field of the nuclear physics require high quality ion beams. This statement is true both for the primary beams accelerated at a cyclotron, and for secondary beams obtained as a result of a nuclear reaction.
This work contains information about new setup named as Cryogenic gas stopping cell at the Flerov laboratory of nuclear reactions at the Joint institute for nuclear research.
The main task of the Cryogenic gas stopping cell (CGSC) is the transformation of the secondary rare ion beams produced in nuclear reactions with high energy and large emittance into low-energy beams with small emittance and low energy spread. The CGSC consists of the stainless-steel outer and inner chambers. The outer chamber is at the vacuum pressure and works like the thermal insulation. It also reduces the radiation heat transfer to the inner chamber by the insulation foil. The temperature inside of the outer chamber is the room temperature (293 K). The inner chamber is filled by the helium buffer-gas and it is also platted from the outside by the copper for the homogenous distribution of the temperature. The inner chamber is cooled to the 40 K by the cryocooler. The set of the cylindrical and the conic electrodes are installed inside of the inner chamber.
Today this setup is under testing stage. First tests of the Cryogenic gas stopping cell with the 223Ra alpha source are started. The daughter products are guided through the helium with the help of the inside structures of electrodes, extracted, filtered from gas, penetrated to the aluminum foil and registered after its alpha decays. Several dependences of normalized intensities versus voltage ranges and levels of the inside electrodes at the T=293,7K are measured. Dependency of the helium pressure at the T=293,7K inside the cold chamber and normalized intensity is also done.
Preliminary efficiency about 20% at T=293,7K inside and the best suitable voltages was achieved.

Section

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