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163Ho distillation and implantation for Holmes experiment

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The HOLMES experiment aims to directly measure the ν_e mass using a calorimetric approach. The choice of ^{163}Ho as source is driven by the very low decay Q-value (~ 2.8 keV), which allows for high sensitivity with low activities (O(10^2)Hz/detector), thus reducing the pile-up probability.
^{163}Ho is produced by means of neutron irradiation of a $^{162}Er_2O_3$ sample; then, it is separated from the other species generated during the irradiation process. A chemical process removes every species other than Holmium, but this is not sufficient to remove all potential background sources: infact, ^{166m}Ho has a beta decay (τ ~ 1200y) which can induce signal below 5 keV. The contaminants removal is crucial so a dedicated implanting system has been set up. It is designed to achieve an optimal mass separation @163 a.m.u. allowing an efficient implantation of ^{163}Ho inside the detectors arrays. The implanter is made by a sputter source, an acceleration section and a magnetic dipole followed by a x-y scanning stage and a focusing electrostatic triplet. In this poster the first results on a beam obtained with a preliminary sputter source are presented.

Less than 5 years of experience since completion of Ph.D

N

Student (Ph.D., M.Sc. or B.Sc.)

N

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