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# Inside Holmes experiment: 163Ho metallic target production for the micro-calorimeter absorber

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The main goal in the HOLMES experiment is the neutrino mass measurement using an array of 1000 microcalorimeters with standard metallic absorber. A good isotope for such measurement is the 163Ho, those isotopes embedded in the metallic absorber will be 1012. Since 163Ho is not available in nature, a dedicated process must be set up to produce the amount needed for this neutrino mass experiment.

The process with the highest born-up cross section is the neutron irradiation of Er2O3 enriched in 162Er:162Er(n,γ)163Er⟶163Ho+νe, where the decay is an EC with half-life of about 75 min and the σ(n,γ) is about 20 barns for thermal neutron.

After the neutron irradiation in the oxide powder there are several radioactive isotopes which are potentially disturbing the background below 5 keV. The chemical separation of holmium from the irradiation enriched Er2O3 powder is therefore mandatory and will be performed by means of ion exchange chromatography.

On the end of those processes the oxide powder enriched in 162Er will have the 163Ho isotope number required. The holmium chemical state influences the end point of the EC spectrum, in order to avoid such effect it is necessary to embedded in the absorber only the metallic isotope.

Reduction and distillation technique allowed us to obtain a pure metallic holmium, starting from natural oxide holmium. This technique will be applied on the irradiated oxide powder to obtain the metallic 163Ho, ready to be embedded in the micro-calorimeter absorber.er.

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