

Proposal to the Physics-III Committee at CERN, Geneva  
c.o. Dr. F. Herz, Secretary of the Physics-III Committee

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On the Possible Production of 1.) Superheavy Elements and 2.) Unknown Spontaneously Fissioning Activities a' la Pontecorvo<sup>1)</sup> in the Interaction of High-Energy Protons with Thorium.

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Presently, the Nuclear Chemistry Group at CERN is searching for superheavy elements and transuranium actinides using an uranium target. Independent of the outcome of this experiment, it would be interesting to compare the production rates for any transuranium nuclide as a function of the production target. (N and Z are sufficiently different for  $^{232}_{90}\text{Th}$  and  $^{235}_{92}\text{U}$ ). In addition, we want to take the purified thorium-sample and search there for spontaneous fission activities in the rotating bubble-chamber, operating in Marburg. (This instrument is often called "spinner" and was invented by Mahn, Bern). This "spinner" is capable of accepting up to 60 g thorium compounds and detecting in this material<sup>2</sup> spontaneous fission events at a low rate of  $\leq 1$  event/day. All presently known production processes predict no spontaneous fission activities in thorium. Only Pontecorvo<sup>1)</sup> has speculated, that in the interaction of high-energy protons with heavy nuclei unknown elementary particles might be created with long half-lives. If such unknown particles would be created and decay afterwards, they would certainly deposit sufficient energy to induce fission in thorium. ( $G_f/G_{tot.} \approx 0.5$  at high energies). The range of half-lives to be investigated would be in the order of days up to one year.

Irradiation details: The best for us would be the use of thorium-metal as a production target in the slow ejected beam for one PS-period. The alternative proposal would cause less interference: A thorium-target would be placed in the beam-dump of the fast-ejected bubble-chamber beam (possibly  $e_6$ ) for an extended length of time (up to several monthes).

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The chemical procedures for working up the target will be rather similar to the one described in the proposal by Baechmann, et al. with the additional feature of putting the purified thorium-fraction in the "spinner" and search there for spontaneously fissioning activities.

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1.) B.Pontecorvo, Sov. J. Nucl. Phys. 11, 473 (1970)  
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