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Development of detector technologies for neutron beta decay measurements JIN HA CHOI, CHRIS CUDE-WOODS, ALBERT YOUNG, North Carolina State Univ, LOS ALAMOS UCN COLLABORATION COLLABORATION — In the past year we have developed two detector technologies for neutron beta decay measurements. The first is designed specifically to detect the recoil proton from neutron decay. In particular, the PERKEO III experiments planned for the Institut Laue Langevin require detectors with active area greater than about 600 cmˆ2 area to achieve the targeted statistical sensitivity. We have developed an implementation of transmission foil detectors utilizing free standing foils of roughly 100nm thickness and 700 cmˆ2 area, coated with LiF converting crystal. These foils are placed in an accelerating electric field geometry to first accelerate the protons to 30 kV and then convert them to an electron shower which can be detected with conventional semiconductor or scintillator detectors. We've also begun development of technology that is designed to detect charged particles from neutron-capture reaction on 10B. The UCNtau experiment at the Los Alamos National Laboratories requires non-magnetic neutron sensors that can be used to measure the density of neutrons in a magnetic trap. We are employing a multilayer surface detector recently developed at Los Alamos for the UCN flux monitoring, adapting it for a compact, 1 cmˆ2 detector and ultralow dark rates. The detector consists of 10B on ZnS scintillating sheet that will be adhered to both faces of an acrylic plate with scintillating optical fibers embedded into it. The optical fibers will be coupled to 2, Hamamatsu micro-PMTs for coincident detection of a neutron event.

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