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2.3 High Detection Efficiency Scintillating Fiber Detector for Time-Resolved Measurement of Triton Burnup 14 MeV Neutron in Deuterium Plasma of Middle Size Tokamak

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The behavior of 1 MeV triton has been studied in order to understand alpha particle confinement property in toroidal devices. Time-resolved triton burnup study has been performed by scintillating fiber detectors (Sci-Fi) in large tokamaks [1] and helical systems [2]. The time-integrated triton burnup ratio was successfully measured by activation foils technique in medium sized tokamak [3, 4]. To obtain time evolution of 14 MeV neutron rate under the neutron emission rate of 10ˆ13 n/s to 10ˆ14 n/s in KSTAR, we designed high detection efficiency Sci-Fi having a diameter (f) of 160 mm. In the head of detector1, 2000 scintillating fibers having f of 1 mm and length of 50 mm are embedded, whereas 1000 scintillating fibers having f of 2 mm and length of 50 mm are embedded in the head of detector2. The detection efficiency of those detectors is expected to be one order higher than the detectors used in large tokamaks [1]. Experimental results performed using an accelerator-based neutron generator in Fast Neutron Laboratory and OKTAVIAN will be reported.[1] Barnes C. W. et al 1998 Nucl. Fusion 38 597.[2] K. Ogawa et al., submitted to Nuclear Fusion.[3] J. Jo. et al 2016 Rev. Sci. Instrum. 87 11D828.[4] M. Hoek et al., IPP-Report IPP 1/320 March 1999.

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