Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

New neutron-gamma scintillator diagnostics at the Madison Symmetric Torus LUIGI CORDARO, MATTEO ZUIN, Consorzio RFX (CNR, ENEA, INFN, Universit di Padova, Accierie Venete), JAY K ANDERSON, Department of Physics, University of Wisconsin-Madison, LUCA STEVANATO, CRISTIANO FONTANA, ISACCO BONESSO, Department of Physics, University of Padova, JUNGHA KIM, Department of Physics, University of Wisconsin-Madison — The energy calibration and the first experimental measurements of a diagnostic for the neutron-gamma detection are presented. The system is composed of 6 scintillator cells coupled with flat photomultiplier tubes. One detector cell is based on NaI(Tl) crystal scintillator, the remaining ones use EJ-309 organic liquid scintillators. While the former is used for gamma-ray spectra analysis, the latter are used for fast neutron detection, by means of the Pulse Shape Discrimination (PSD) technique. Energy calibration has been performed with several calibrated radioactive sources, the neutron response function has been analyzed as a function of the neutron time-of-flight, using a ^{252}Cf source tagged by an additional fast plastic scintillator. A high neutron flux has been detected in discharges operated with NBI. The overall diagnostic has proved to withstand flows, up to several Mcounts/ms. The diagnostics is able to detect fast transient phenomena, such as those detected during discrete plasma relaxation events. Fast transient peaks have been detected, allowing the study of fast particles induced by magnetic reconnection events in plasma.

Luigi Cordaro
Consorzio RFX (CNR, ENEA, INFN, Universit di Padova, Accierie Venete)

Date submitted: 02 Jul 2019 Electronic form version 1.4