Lost alpha diagnostic based on an imaging bolometer and a multi-foil thermal detector

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The confinement of alpha particles is an important topic for the operation of a fusion reactor as they should transfer their energy to the fuel plasma and then be exhausted safely through the divertor. If their confinement is poor they could escape through the last closed flux surface and scrape off layer in a spatially localized manner that could do serious damage to the first wall. Therefore the diagnosis of lost alpha particles is important for the operational safety and evaluation of an experimental fusion reactor. A diagnostic device has been proposed [1] based on an imaging bolometer [2] and a multi-foil thermal detector. In this paper we discuss ongoing work with testing prototype imaging bolometers on LHD and JT-60U [3], calibration work using a laser heat source, the testing of a prototype multi-foil thermal detector on an ion accelerator [4] and the design of a diagnostic for ITER.

[1] A.G. Alekseyev et al., proc. 30th EPS CCFPP 2003, ECA 27A P-1.171 (2003).

[2] B.J. Peterson et al., Rev. Sci. Instrum. 74(3) (2003) 2040.

[3] S. Konoshima et al., proc. 32nd EPS CCFPP 2005, ECA 29A P-4.092 (2005).

[4] A. G. Alekseyev et al., proc. 23rd SOFT (2004) P2C-D-220.

This work is partly supported by Grants-in-Aid for Scientific Research of the JSPS, Nos.16560729 and 16082207.