

INTEGRATION DESIGN OF TPE-RX NEUTRAL BEAM INJECTOR ON RFX-MOD

S. Dal Bello, A. Ferro, L. Grando, N. Pilan, A. Rizzolo, C. Taliercio, M. Valisa, P. Agostinetti, P. Bettini¹, A. Gallo, G. Lazzaro, A. Tiso, M. Tollin, E. Zampiva, D. Zella, Y. Hirano², S. Kiyama², H. Sakakita²

Consorzio RFX, Associazione EURATOM-ENEA sulla Fusione, Corso Stati Uniti 4, I-35127 Padova, Italy

¹Department of Electrical Engineering, University of Padova, v. Gradenigo 6/a, 35131 Padova, Italy

²National Institute of Advanced Industrial Science and Technology, Tsukuba 305-8568, Japan

Corresponding author: luca.grando@igi.cnr.it

The TPE-RX Neutral Beam Injector [1], which provides a 25keV positive ion beam energy with a maximum current of 50A for a pulse duration of 30ms, will be installed on RFX-mod thanks to the agreement with the AIST Institute of Tsukuba (Japan).

The main scientific objective is the study of fast particles confinement on RFX-mod.

The integration of TPE-RX NBI on RFX-mod requires the design of several new components: a mechanical interface between the RFX vacuum vessel and neutralizer; a Magnetic Residual Ion Dump (MRID) to deflect the ions not neutralized in order to avoid the damaging of the vessel structures; a new vacuum pumping system to maximize pumping and minimize beam stopping due to reionization has been designed too. Moreover a passive dump is foreseen as protection of the vessel pipes against a not collimated beam.

In order to determine the maximum magnetic field to be produced by the MRID coils beam analyses have been performed also taking into account the effect on the particles trajectory of the RFX stray magnetic field.

The integration work also includes the design of new magnetic shields for the source and the neutralizer to limit the magnetic field below 0.5mT and 1mT respectively, since the stray field on RFX is higher than that produced on TPE-RX.

As far as the power supplies are concerned the compliance of the Japanese equipment to the Italian safety rules has been considered and layout studies have been carried out; the integration of the NBI control system in the RFX timing sequence has been studied as well.

[1] H. Sakakita et al. Characteristics of High-Power-Density and Focused Neutral Beam System, 32nd Conf Plasma Physics Contr. Fus., Terragona, 2005, P4.109