

Design and development of Passive Charge Exchange Neutral Particle Analyzer for ADIYA-U Tokamak

Wednesday 24 October 2018 14:00 (20 minutes)

Passive charge exchange diagnostic is well established technique for measuring core-ion temperature of tokamak plasma. Energetic neutral particles that are formed due to charge exchange of plasma ions with neutral atoms, can escape from the plasma. These neutral atoms that are re-ionized and analyzed using analyzer can provide information about the energy distribution of plasma ions [1].

A passive charge exchange neutral particle analyzer has been designed and indigenously developed for Aditya-U tokamak. It consists of a H₂ gas-cell based stripping cell, a 45-degree parallel plate electrostatic energy analyser, Channel electron multipliers as detectors and an integrated measurement system CEM-IMS as DAQ. The stripping cell, which is made of soft iron, is a 200 mm long narrow tube of diameter 4 mm. The analyzer box is made of soft iron (to reduce the stray magnetic field) and houses the 45-degree parallel plate electrostatic energy analyser and detectors. The CEM-IMS is a modular integrated measurement system capable of recording the measurements by remote control via network. CEM-IMS will be used as a pulse counting module to acquire output pulses of channel electron multipliers of charge exchange neutral particle analyzer. Energy calibration of the neutral particle analyzer has been carried out using plasma discharge based H⁺ ion source. This paper describes the principle of core-ion temperature estimation and the design, development, and calibration of the Passive Charge Exchange Neutral Particle Analyzer for ADIYA-U tokamak plasma.

References:

1. T. A. Santosh Kumar, L. M. Awasthi, C. Chhaya, H. D. Pujara, B. N. Buch, H. R. Prabhakara and S. K. Mattoo, A technical report: Aditya Charge Exchange Diagnostics, IPR/TR-56/96, February 1996.

Country or International Organization

India

Paper Number

EX/P4-23

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Session Classification: P4 Posters