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14.55 Development of a time-of-flight low-energy neutral particle analyzer on EAST tokamak

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To understand the erosion effect of neutral particles on the first wall, a time-of-flight low energy neutral particle analyzer (LENPA) has been developed on EAST tokamak. The LENPA mounted on the EAST mid-plane consists of a chopper system, a 3 m long flight tube, two sets of detector assemblies and data acquisition, vacuum, power supply and control systems. The neutral outflux is gated in bunches of 1 μ s time scale by a slotted rotating disc driven by a turbomolecular pump modified motor. A He-Ne laser beam is projected through the disc slit to record the instants of chopper slits opening by triggering an avalanche photodiode module. An on-axis electron multiplier detects chopped neutrals, and a central perforated Cu-Be plate is employed to channel the emitted secondary electrons into an off-axis electron multiplier. The radiation peak of on-axis electron multiplier caused by photons projected through the hole of Cu-Be plate is an alternative way to record the chopper slits opening time. With a fast memory card, 1GS/s sampling rate can be realized by means of a GaGe acquisition card continuously. The LENPA data will improve the understanding of wall material erosion by neutrals in a long pulse tokamak and make better predictions for the future devices, such as ITER and CFETR.

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