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Measurement of argon impurity by X-ray imaging crystal spectrometer on J-TEXT

A tangential X-ray imaging crystal spectrometer (XICS) has been upgraded on J-TEXT tokamak to measure the electron/ion temperature and the plasma toroidal rotation velocity. The XICS has been designed to receive emissions of Ar XVII from -13 cm to $+13$ cm region with a spatial resolution of 1.8 cm in the vertical direction. The temporal evolution of Ar impurity density profiles after an argon gas puff could be observed with a time resolution of up to 2 ms. The emissions of Ar XVII can be modulated by the resonant magnetic perturbations (RMPs) which indicates that the transport of Ar is affected by the RMP significantly. The 2/1 RMPs can lead to field penetration with enough RMP amplitude. The XICS provides a tool for the study of the transport of Ar impurities during the penetration of RMP. During the field penetration phase, the emissions of Ar XVII decreased and the profile of Ar XVII became narrow. The phenomena show that the transport of Ar impurity in the core region has been enhanced during the field penetration phase.

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