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4.24 Design of Ultra-fast Charge eXchange Recombination Spectroscopy diagnostic and photon flux simulation on EAST tokamak

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Four-channel Ultra-fast Charge eXchange Recombination Spectroscopy (UF-CXRS) diagnostic has been designed and is under construction on EAST tokamak. The key components of coating fiber bundles, spectrometer, lenses, detectors and data acquisition system are presented. The transmission of the whole optical path is designed to be about 50%. The temporal resolution of this diagnostic is 1 microsecond and the spatial resolution is at the order of centimeter. The photon flux of every channel is simulated by consulting ADAS data base basing on electron temperature and density profiles measured by Thomson Scattering and carbon ion C6+ simulated by Strahl code. The simulation result is compared with the experimental profile diagnosed by the traditional Charge eXchange Recombination Spectroscopy. It is shown that UF-CXRS channel will has a strong photon flux around the radial position of ρ=0.75, which is determined by C6+ profile peak. A 128-channel UF-CXRS system will be constructed in the nearly future.

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