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## 10.26 Photoelectric detection system of a fast-ion D-alpha diagnostic on experimental advanced superconducting tokamak

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A corresponding photoelectric detection system was initiatively designed for fast-ion D-alpha spectrum diagnosis on Experimental Advanced Superconducting Tokamak (EAST). The biggest challenge in designing is to improve the signal-to-noise ratio to detect the FIDA signal in the same spectral range from the other light sources when the neutral beam is injected. The new photoelectric detection system consists of a photomultiplier tube (PMT) and a current amplifier (using a sapphire material instead of a conventional printed circuit board) with high temporal resolution and spatial resolution. The system parameters are designed with a total photon-to-voltage gain of and the current amplifier with a current-to-voltage gain of  $V/A$  and a -3dB bandwidth at 300kHz. The EAST discharge experiment in July 2017 showed that the FIDA signal was well detected and the fast ion properties were deduced from the Doppler shift spectrum of D-alpha light.

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