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### 4.3 Application of a novel soft X-ray camera based on 2-D Gas Electron Multiplier (GEM) detector for the EAST high neutron background plasmas

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A novel soft X-ray diagnosis has been designed for the Experimental Advanced Superconducting Tokamak (EAST) high neutron and/or gamma background discharges, which is based on a triple Gas Electron Multiplier with 2D imaging. With the working gas of mixed Ar (70%) and CO<sub>2</sub> (30%), the GEM is sensitive to the X-ray photon energy below 30keV. This system is installed in the horizontal window A with a tangential angle of nearly 12 degree to the toroidal field on EAST aiming to directly identify core instabilities and heavy impurity transports etc. The spatial resolution is controlled by stepping motor which moves the GEM in front of a collimating pinhole to realize the zooming in/out function of the camera. Due to the limitation of movable distance, the maximum spatial resolution is 3 cm. A 100 um thickness of beryllium foil is used to cut off the low energy photon (<3keV) which guarantees a rational X-ray flux for high performance plasmas. The GEM has been tested in ENEA (Frascati) Laboratory by several X-ray sources which shows the ability to remove the white noise by setting environmentally determined threshold voltages. For the incoming campaign, this camera is applied to image the soft X-ray radiations for EAST high-performance shots with strong neutral beam injection heating.

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