Control of the impurity transport in the edge region of magnetically-confined plasmas has attracted an attention in the fusion research to sustain high-performance plasma and mitigation of the divertor heat flux. For the purpose the edge impurity transport and its effect on the plasma performance have been investigated in the large helical device (LHD). In particular, effects of thick stochastic magnetic field layer located outside the last closed flux surface (LCFS) called “ergodic layer” on the impurity transport have recently attracted. Therefore, a precise measurement on the spatial profile of impurity line emissions in the ergodic layer is necessarily required to investigate the characteristics of the impurity transport in stochastic magnetic fields.

The vacuum ultraviolet (VUV) lines from impurity ions are significantly emitted in the ergodic layer because the electron temperature around LCFS is about 500eV in maximum. We have developed a space-resolved VUV spectroscopy using a 3 m normal incidence spectrometer for the measurement of the spatial profile of VUV lines from impurities emitted in wavelength range of 300-3200 Å. A vertical profile of VUV line emissions as a wavelength-dispersed image is projected on the CCD detector by optimizing a slit for spatial resolution called “space-resolved slit” mounted between the entrance slit and the grating in the spectrometer.

As preliminary results, profiles of the emission intensity and the ion temperature were obtained simultaneously using the CIV spectra of 1548.20±2 Å in high-density discharges. The intensity profile showed a peak structure outside LCFS as a result of line integration in a long path along the sightline through the ergodic layer. The position and width of the peak structure varied depending on the position of LCFS and the thickness of the ergodic layer, respectively.