EVALUATION OF HALO EFFECT FOR CHARGE EXCHANGE RECOMBINATION SPECTROSCOPY ON ITER [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2021.48.1.166

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Charge eXchange Recombination Spectroscopy (CXRS) will be used for measurement of the ion temperature, density and rotation velocity on ITER [1, 2]. This data can be obtained from analysis of the charge-exchange emission of impurity ions and hydrogen, produced due to high-energy beam injection.

The obtained spectrum consists of several components including active charge exchange spectrum that contains the required data on plasma ions. The high-energy beam injection produces so-called halo cloud around the neutral beam path through the plasma. The existence of halo effect makes the extraction of the active component from spectrum more difficult because it causes distortion of the active spectral contour [3, 4]. This effect also leads to worsening of the spatial resolution.

The Simulation of Spectra (SOS) code [5] was used for the halo effect modeling for four impurities (He, C, Be, Ne) and bulk deuterium in cases of the main scenarios at ITER.

According to modeling results, the halo emission contribution to the intensity of the active spectral component is less than 20% for impurities and reaches 46% for bulk deuterium. The halo effect also significantly affects radial resolution and worsens it by half in the middle of plasma minor radius for D-alpha spectrum. Therefore, halo effect should be considered when analyzing CXRS data on ITER.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/E/ru/HH-Pavlova.docx) [↑](#footnote-ref-1)