

Hydrogen atomic and molecular emission locations and intensities in the LHD edge plasma determined from simultaneously observed polarization spectra

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We observed polarization resolved emission spectra of the Balmer- α , - β , and - γ lines of hydrogen atoms and the Q branches of the Fulcher- α band of hydrogen molecules simultaneously [1] with six lines of sight in a poloidal cross section of the Large Helical Device (LHD). From the fit of the spectra including the line splits and the polarization dependence by the Zeeman effect, we determined the emission locations and intensities of the atoms and molecules. As shown in Fig. 1, the determined emission locations of the hydrogen atoms were just outside the last closed flux surface and the intensities showed small dependence on the location. For the molecules, the determined emission locations were rather around the divertor legs and the intensities showed location dependence.

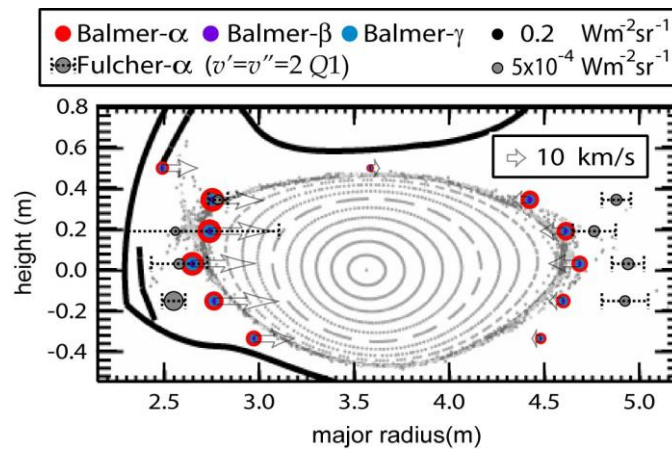


Fig. 1 An example of the determined emission locations and intensities of the Balmer- α , - β , and - γ lines of hydrogen atoms and the Fulcher- α band of hydrogen molecules from the observed spectra. It is noted that the scales of the atomic and molecular emission intensities are three orders of magnitude different.

[1] K. Fujii, T. Shikama, M. Goto, S. Morita, M. Hasuo, *Phys. Plasmas* **20** (2013) 012514.