EUV FeXVII emission line branching ratio

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ABSTRACT

Ne-sequence iron ions, FeXVII, are formed around the temperature of log T_e ~ 6.7, which nearly corresponds to the maximum temperature reached in solar active regions. The EIS instrument on board the Hinode mission [1] has detected several week FeXVII emission lines appearing in its observing wavelengths (170 - 210 Å, 250 - 290 Å), and they are identified as those from the transitions between $2p^5$ 3s/3p - $2p^5$ 3p/3d.

Warren et al. (2008) [2] found that the observed intensity branching ratio of the transitions from the $2p^5 3p$ ($^1S_0$) level to the $2p^5 3s$ ($^{1,3}P_0$) levels contradicted with theoretical predictions by a factor of ~ 2 and Del Zanna and Ishikawa (2009) [3] noticed that FeXVII λ204.6 line was blended by emission lines originating from the transition regions.

Intensity ratios of these lines having a common upper level are successfully measured in the Large Helical Device (LHD) at NIFS, and the experimental value is derived to be ~ 1.1, by separating the contributions of blending FeXII and FeXIII lines [4, 5].

Re-analysis of an AR core and a small flaring event on 2007 June 2 reveals that the intensity ratio reduces significantly to ~ 1.5, by considering TR line blending, but it is still systematically higher than the experimental value.

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