

Abstract Submitted
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Study of magnetic dipole forbidden transitions in Large Helical Device and its application to impurity and α particle diagnostics in burning plasmas SHIGERU MORITA, MOTOSHI GOTO, National Institute for Fusion Science, RYUJI KATAI, ILE-Osaka, MALAY CHOWDHURI, Graduate University for Advanced Studies, ATSUSHI IWAMAE, Kyoto University — Magnetic dipole forbidden (M1) transitions of Al ($Z=13$) to Xe ($Z=54$) emitted in visible and VUV ranges have been observed in Large Helical Device (LHD) and analyzed with level population calculation. It is found that the ratio of the M1 transition to usually used electric dipole (E1) transition gives clearly separated two ranges exhibiting density-independence and density dependence. Observation of orthogonal linearly polarized components of the M1 lines gives a completely different structure from the E1 transitions. Diagnostic applications to burning plasmas, i.e., impurity spectroscopy using the M1 transitions from high-Z elements such as Mo and W and alpha particle measurement using the ratio of the M1 to E1 transitions and the Zeeman-polarization technique are presented.

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