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**Interpretation and application of extracted features of radiative collapse in Large Helical Device with sparse modeling**[1] TATSUYA YOKOYAMA, HIROSHI YAMADA, The University of Tokyo, SUGURU MASUZAKI, JUNICHI MIYAZAWA, KIYOFUMI MUKAI, BYRON PETERSON, NAOKI TAMURA, RYUICHI SAKAMOTO, GEN MOTOJIMA, KATSUMI IDA, MOTOSHI GOTO, TETSUTARO OISHI, MASAHIRO KOBAYASHI, GAKUSHI KAWAMURA, NIFS, LHD EXPERIMENT GROUP TEAM — The features of radiative collapse have been extracted from high-density plasma experiments in Large Helical Device (LHD) with a sparse modeling technique. The extracted features have been used to explore the underlying physics of the radiative collapse and to develop a machine learning predictor of the collapse. The Sudo scaling is well known as a density limit scaling in stellarator-heliotron plasma. It includes only heating power density and magnetic field but it is thought that more operational conditions than those in the Sudo scaling are involved in the physics of radiative collapse. As extracted features, light impurities emission and electron temperature are relevant parameters to predict the occurrence of radiative collapse. Therefore, impurity radiation at the plasma edge especially outside the LCFS has been investigated. Also, the operational limit and the collapse predictor have been developed based on the extracted features and over 85% of collapse discharges in LHD have been predicted successfully at least 30 ms before occurrence.

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Tatsuya Yokoyama
Univ of Tokyo-Kashiwanoha

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