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STARK BROADENING MODELING WITH ML AND AI ALGORITHMS

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During past 20 years many Stark broadening models were developed that can calculate spectral lineshape and estimate a line width that is extensively used in plasma diagnostics of both astrophysical and laboratory plasmas. Some of these calculations yield results relatively fast, some of them need a lot of computational time. Therefore, idea of creating a machine learning (ML) model emerged as a tool for fast estimation of Stark width without need of huge computational time. In our approach, out of three tested models, random forest (RF) algorithm showed the best predictive power after it has been trained, where the coefficient of determination $R^2 = 0.94$ was obtained. Model was trained on a database created by merging parameters from Stark B and NIST atomic databases, it had 14 input parameters that were used to predict final Stark width. Results were compared with experimental ones as well as with SCP theory. We also checked for regularities in Stark effect, and they were also confirmed and in agreement with previous findings.