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**Deep Learning for Extracting Electron Cross Sections Using Data Available on LXCat** VISHRUT JETLY, BHASKAR CHAUDHURY, Group in Computational Science and HPC, DAIICT, Gandhinagar, India, 382007, LEANNE PITCHFORD, CNRS and Univ. Toulouse III, France — Conventional iterative algorithms for solving the inverse swarm problem of determining scattering cross sections from electron swarm data are rarely used because they require in-depth domain expertise and are computationally expensive. Moreover, these methods can be error prone due to the unavailability of accurate electron energy distributions. To address these issues, we propose the use of deep learning models which are trained using the elastic momentum transfer, ionization and excitation cross sections available from LXCat (www.lxcat.net) [1] and their corresponding swarm data calculated using the BOLSIG+ solver [2] for the numerical solution of the Boltzmann equation for electrons in weakly ionized gases. Pearson's correlation coefficient between different swarm data is computed and used to select appropriate inputs to the deep learning models such that the redundancy is reduced without decreasing the overall information content. The performance of the artificial neural network (ANN) and the convolutional neural network (CNN) indicates that CNN yields better results in most cases as it effectively extracts local patterns from the swarm data. Both trained networks have been validated for a broad range of gas species and the uncertainty in the prediction has been estimated. [1]. L. C. Pitchford et al., Plasma Process. Polym. 14, 1600098 (2017). [2]. G. J. M. Hagelaar & L. C. Pitchford, PSST, 14, 722-733 (2005).

Bhaskar Chaudhury
Group in Computational Science and HPC, DAIICT, Gandhinagar, India, 382007

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