



AAPPS-DPP2022 Invited/Plenary Nomination Form

0. Recommender's name, E-mail and affiliation

Name: Jie Yang E-mail: yangjie_sonic@163.com Affiliation: Xidian University

1. Session category: B

2. Type: Plenary

3. Speaker: Jie Yang;

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4. Rationale:

Learn and exchange knowledge about basic plasmas

5. Short abstract for 5th Asia-Pacific Conference on Plasma Physics

Authors: Yang Jie, Weimin Bao, Xiaoping Li, Yanming Liu

Title: Temperature Prediction of Inductively Coupled Plasma Generator Quartz Tube Based on Deep Belief Network

Abstract:

The near space high-speed target plasma electromagnetic science experimental device provides an experimental platform for the ground to carry out reliable communication research in the high-speed target plasma environment. The generation of plasma is a complex process completed by the cooperation of multiple subsystems. However, the condition of the quartz tube affects the properties of the plasma inside it. In order to accurately and reliably predict the condition of the quartz tube and ensure the stable operation of the device, this paper is based on physical quantities such as air intake, power supply, temperature of the quartz tube, and air pressure at the end of the quartz tube. By using Deep Belief Network (DBN) to process complex data and the correlation between data, a data-based method for predicting the condition of quartz tubes is proposed. First, an improved DBN is proposed by introducing a Gauss-Bernoulli restricted Boltzmann machine; Then graph regularity constraints and sparse representations are embedded in the improved DBN model to achieve fast initialization of parameters and to extract discriminative features in unsupervised method; Finally, the quartz tube temperature is used as the output of the model to predict the condition of the quartz tube. The research results show that the method is superior to the traditional data-driven method, and can learn the correlation of the data with high performance, and predict the temperature of the quartz tube in different working environments.