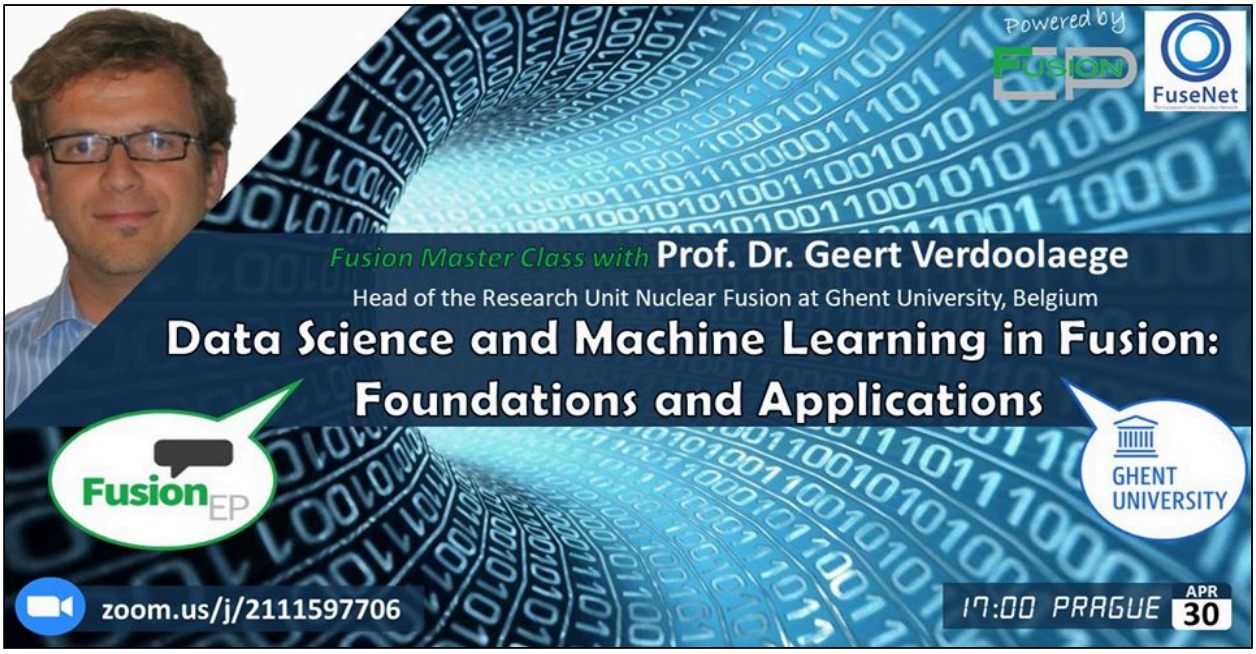

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Title: Data science and Machine learning in Fusion

Speaker: Prof. Dr. Geert Verdoolaege, Head of the Research Unit Nuclear Fusion, Ghent University (Be)

When: 2020-04-30 17:00:00

Abstract: Fusion research and development can benefit greatly from modern data science methods, both for increasing the understanding of the underlying plasma physics and for optimizing the design and operation of fusion machines. From basic statistical techniques for model fitting, to Bayesian methods for probabilistic analysis of data from single or multiple diagnostics, to the latest machine learning techniques for anomaly detection and uncertainty quantification: the applications are numerous and the possible approaches originate from a broad range of sub fields of the information sciences. In this talk, the speaker will illustrate with a number of applications some recent developments in the relatively new field of Fusion Data Science. The speaker will start by highlighting the key role played by the solid mathematical foundations of this work, as well as the necessity to combine physics insight with proper data-analytical models, in order to maximize the opportunities for understanding and control of the plasma. This will be followed by a brief tour of some data science applications in fusion, including regression analysis, classification, data visualization and tomography. Finally, recent work will be presented concerning predictive maintenance of components and subsystems in fusion devices.

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