

Popular Scientific Abstract

Title: Artificial Neural Networks to Reconstruct Properties of Magnetic Equilibrium in Wendelstein 7-X

Author: Marko Nikolaos Blatzheim

Nuclear Fusion, the process that heats the sun, would be a great new energy source on earth but it is complicated to control. The temperatures required to enable that process are about a hundred million degree and matter is no longer in the gas phase but transformed to plasma. In the experiment Wendelstein 7-X, the latest generation of so-called stellarators, the plasma is confined by strong electromagnets. The plasma edge is diverted to specific regions of the vessel wall with a high heat resistance. The vessel is monitored by infrared cameras and the visible heat load pattern highly depend on the plasma properties. In this thesis, artificial neural networks are used to reconstruct some of these properties. They can be trained with data of performed experiments and simulations. The goal is a program that learned to interpret the infrared images in real-time to increase the knowledge about the plasma. Those results can be useful for further research and improve the heat flux control.