Contribution ID: **45** Type: **Oral - Invited**

Tutorial_3: A systems and control perspective on fusion plasmas

Monday, 6 September 2021 15:30 (45 minutes)

A short historical overview of modern systems and control theory is given. Basic systems and control concepts are introduced, with special emphasis on their relevance for Nuclear Fusion research.
Control parameters and associated processes for present-day fusion experiments are identified and classified. The state-of-the-art fusion plasma control for these categories will be presented. The gap to burn control will be identified and it will be shown that a model based control approach is essential for the development of control of fusion reactors.
Models are required to synthesize controllers and test their performance, to interpret data of multiple sensors in real-time, and to anticipate and avoid limits in the plasma. We will discuss how such models can be built from first principles or can be extracted from experimental data. Finally, we will discuss the (need for the) development of supervisory controllers, essential to deal with discrete events in the plasma that necessitate a change in the controller functionality.

Primary authors: Prof. DE BAAR, Marco (NWO institute DIFFER); Dr VAN BERKEL, Matthijs (NWO institute DIFFER)

Presenter: Prof. DE BAAR, Marco (NWO institute DIFFER)