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Prof. Dr. Silvia Daun graduated 2003 from the University of Cologne with an outstanding diploma and received her doctoral degree (Dr.rer.nat) in Mathematics in 2006 under the supervision of Prof. Seydel. After a postdoctoral position at the University of Pittsburg and a Junior Group Leadership at the University of Cologne, she received the venia legendi (Habilitation) 2014 in Computational Biology at the University of Cologne. She continued her work as head of the Research Group 'Computational Neurology' at the Institute of Neuroscience and Medicine INM-3 at the Research Center Jülich where she became the Deputy Director in 2018. She is especially interested in how rhythmic motor activity in the nervous system is generated, and in understanding the neural mechanisms underlying animal locomotion and movement control. She uses mathematical models and hence numerical simulations, as well as Dynamical Systems and Bifurcation Theory.

Title of the lecture

TMS-EEG: A promising readout in neurorehabilitation?

Many neurological disorders result from dysfunctional brain network connectivity. Despite progress in understanding the neural mechanisms underlying recovery of function at a systems level perspective, our knowledge on individual recovery profiles and individualized treatment regimes is still limited. For this, the identification of those brain regions which are most relevant for functional recovery at an individual level is crucial.

An interesting approach for new readouts of the integrity of functional brain networks is the combination of electroencephalography (EEG) with transcranial magnetic stimulation (TMS). TMS-EEG represents a non-invasive perturb-and-measure approach that simultaneously informs about local neuronal states as well as signal propagation at the functional network level. Therefore, this approach holds the potential to serve as a non-invasive network readout in individual subjects and patients.

This talk will introduce the method of combined TMS-EEG measurements, discuss possible applications, the challenges that come with it and highlight its potential role in neurorehabilitation.