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Digital Twins and Virtual Experiments: developments and chances

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Recent experiences have highlighted that in order to ensure the continued success of neutron scattering as a method, user support must be improved not only at the facilities, but also while users are still in the planning, proposal-writing and preparation stages of an experiment.

Digital twins, which provide a virtual copy of neutron scattering instruments and their user interface(s), are an ideally suited mechanism to familiarize users with the specifics of the instrument as well as the used software, and their features and limitations.

Combined with a realistic simulation of neutron trajectories and scattering behavior at the sample, digital twins can also be made into a powerful tool for the preparation of experiments, e.g. to estimate beamday requirements or feasibility of different configurations.

In this talk, I will show how practical implementation of such digital twins can look like, how to make them accessible to users, and what future developments can be expected in this area.

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