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The ESTIA beamline at ESS - a new paradigm for neutron reflectometry

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Neutron reflectometry is a powerful tool for investigating thin films and interfaces, with a host of industrially relevant applications from model cell membranes to next generation hard drive materials and everything in between. The information which can be extracted has all the usual benefits of using neutrons: isotope and light element sensitivity, as well as absolute magnetometry, but is severely limited by neutron flux. After users have made unusually large samples, we still often have to cut the incident beam from cm down to 100um to keep the beam footprint solely on the sample.

This has been the standard modus operandi since the first reflectometry experiments approx. 40 years ago. However, since the realization of the Selene guide system (on AMOR at PSI), another option has existed – to focus the neutrons onto the sample, in our case directly from the moderator face. This approach gains orders of magnitude more flux than collimating but comes at a significant technical cost.

In this talk I give an overview of the ESTIA instrument at the ESS, highlight the challenges which come with trying to truly focus a neutron beam and go over some of the new experiments which will be possible.

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Instrumentation and methods

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