Testing MCNP+McStas Coupling
Experiments and Simulations at BOA/PSI

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Past Validation of initial MCNP+McStas coupling

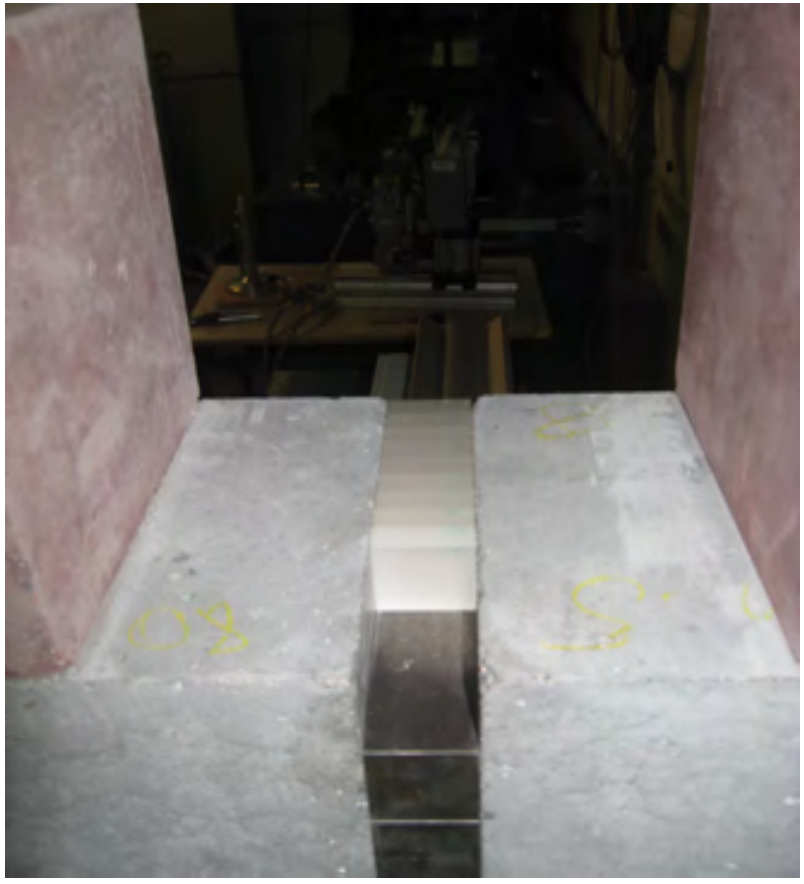
Software coupling developed by Esben Klinkby et. al. at DTU

- Our task at PSI:
  Can we use MCNP + McStas to reproduce an experiment performed at PSI's BOA beamline?
- We chose to simulate our measurements of 'cold' neutron transmission through sapphire crystals

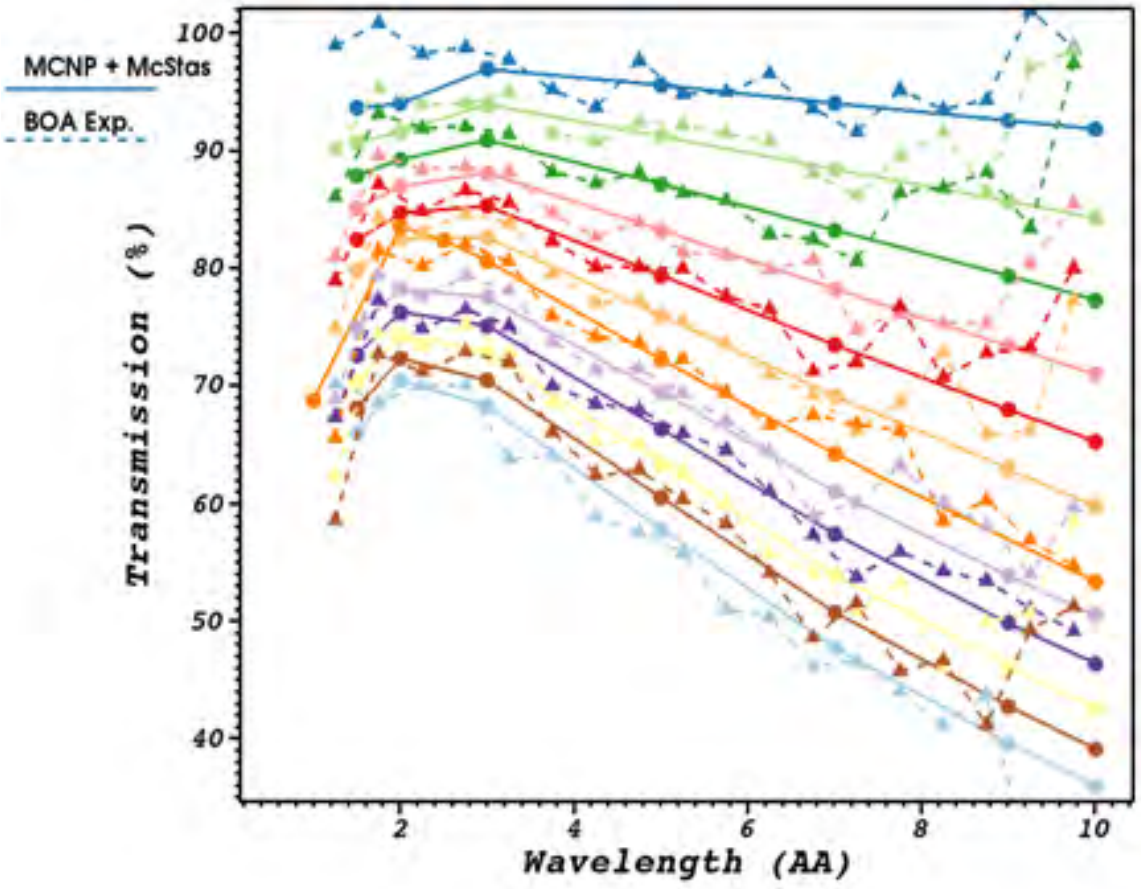
(cold) n absorption by sapphire crystals

Source + BOA → Air → Sapphires → Air

McStas → MCNP → McStas → MCNP



(cold) n absorption by sapphire crystals



Overall

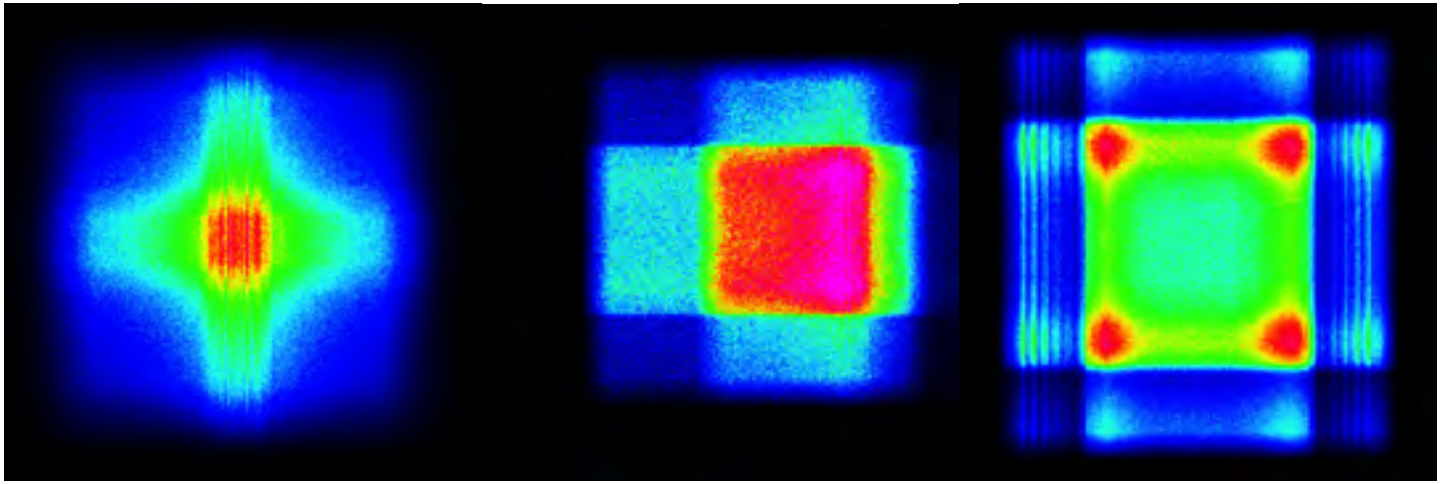
Coupled MCNP + McStas successfully reproduced the expected results

- BOA is a general purpose testing beamline at SINQ,PSI
- Modular : a wide range of measurement setups can be realized
- Widely used for developement and testing of neutron optics components and in particular neutron lenses (focus/defocus-, adaptive-, cryo-, lenses)
- Because BOA is used for development of new components, simulations of the beamline are almost always accompanying the experimental measurements.
- McStas code describing BOA beamline reliably tested
- MCNP description of BOA's view of SINQ also tested
- BOA interior MCNP code also available

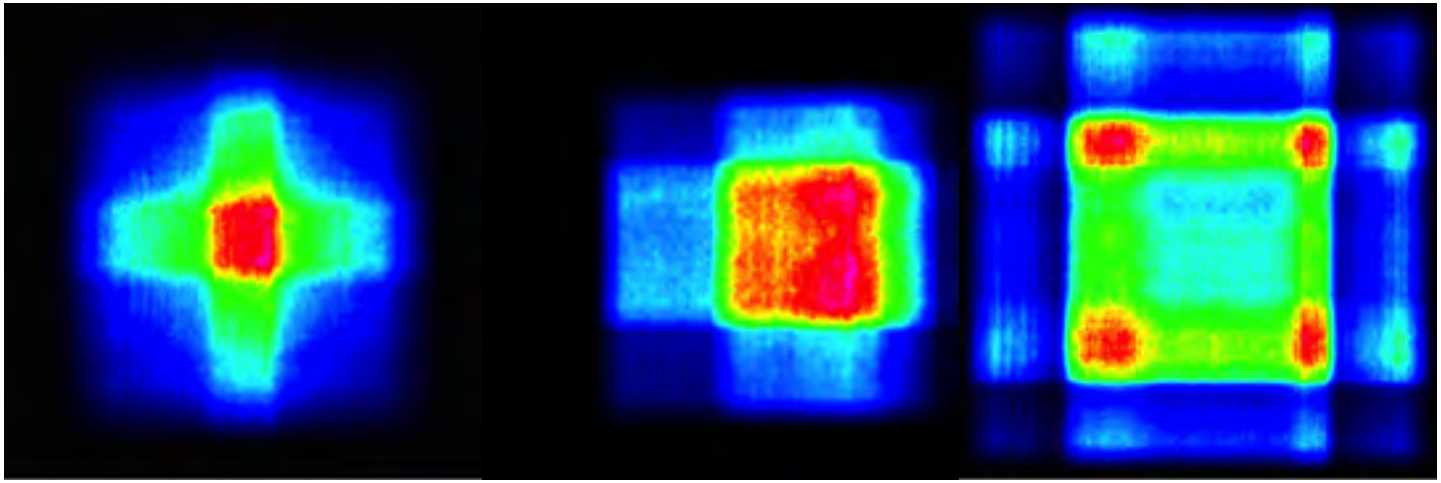
ideas for testing of new MCNP-McStas coupling:

–again a sapphire (or other filter) experimental setup
– simple focusing lens set-up

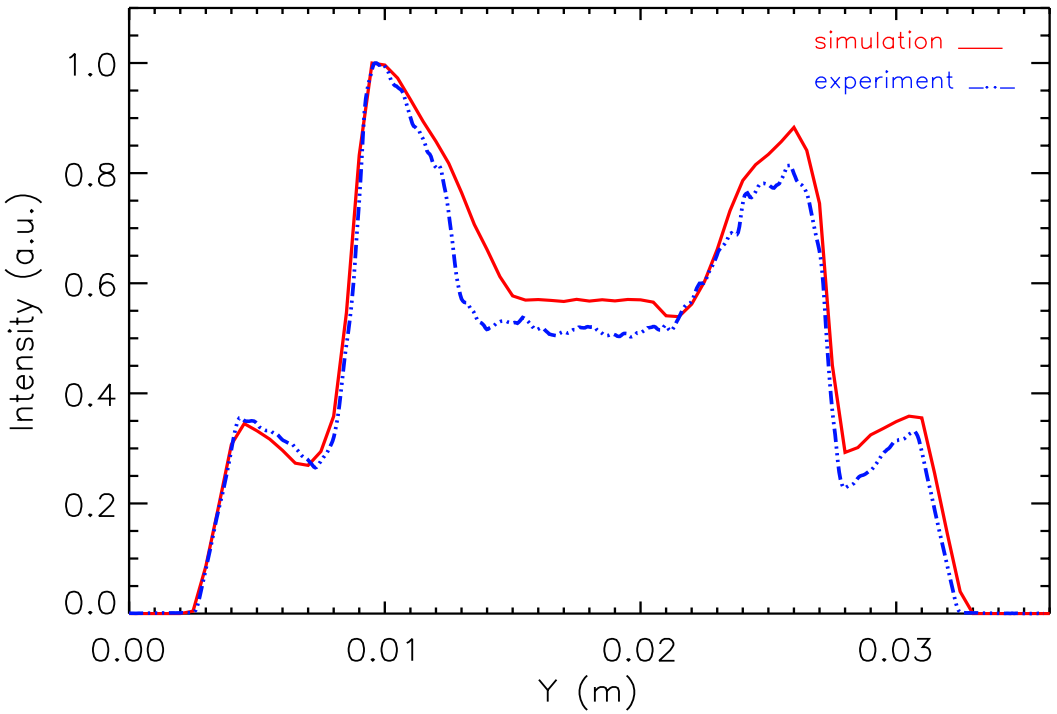
simulation



experiment



upcoming experiments for MCNP-McStas coupling testing



timeframe for experiments/testing

- Experiments (if new measurements are necessary) will take place in the next operating cycle of SINQ: Q3-Q4 2017
- Exact dates of experiments will be specified in annual BOA meeting, February 2017
- Any particular requests concerning the experimental measurements should be communicated before that date
- If existing measurements are to be used, the comparison to simulations can take place as soon as the new coupling is available for testing.

Done

- Changes and additions to: Virtual_mcnp_ss_input, Virtual_mcnp_ss_output, subs.f
- Output file from Mcstas has the correct number of neutrons in the header
- The neutrons number read from the input file from Virtual input is used as -ncount in the run. (i.e. ncount given eithr in mcgui or command line gets ignored)
- Name of input file (for Virtual input) and output file (from Virtual output), can be user defined (default names are rssa and wssa respectively)
- User can define (through a flag), if ptrak file is to be written or not

To do

- Parallelization of subs.f subroutines
- For now a hack is used whenever a simulation sequence is to be started with McStas. Come up with a more clever idea for that.