



Contribution ID: 28

Type: **not specified**

Performance of the Selene guide of Amor and related optics

Friday, 3 March 2023 14:30 (30 minutes)

Starting with the idea, that the ideal neutron guide is one which delivers as much useful neutrons to the sample as possible, but not more, led to the development of what I called 'Selene optics'. Later it turned out that it was already suggested in 1963 by Maier-Leibnitz - and it is based on the same principles as many synchrotron beam lines.

Also, there is not one ideal guide design for all applications.

In short, the Selene optics consists of two subsequent elliptic reflectors, sharing the long axis and a focal point.

This set-up forms an imaging optics, mapping some luminescent area (the 'virtual source') to the sample (or detector) position.

Two reflectors are necessary to correct to first order for coma aberration.

During the SINQ upgrade program in 2019 a Selene guide was installed for the neutron reflectometer Amor.

And even though the secondary instrument is not yet ready for user operation, we managed to perform several measurements to characterise the guide's performance and the instrument's capabilities.

I will present the concept and design of the Selene guide, the actual realisation including the compromises and the mentioned first measurements.

This includes the new polariser which is optimally adapted to the beam converging to or emerging from a small spot, respectively.

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