Reflectometer(s) for the ESS
suggestions by the Danish-Swiss working group

workshop on WP 2
Lund, 29.04.2011
selene approach: focusing in the scattering plane
– concept
– principle lay-out of a full instrument
– tests on Amor
– to be done for ESS

soft matter
medium resolution, horizontal sample plane
⇒ short instrument, moderate focusing in the sample plane
(GISANS: strong focusing to the detector)

small samples
magnetic layers, variable resolution, vertical sample plane
⇒ moderate length, strong focusing in the sample plane
selene — aberration

PNR-3
geometry in the scattering plane
sample: 1000 Å Ni on glass

conventional set-up horizontal focusing 1500 rpm

selene set-up no horizontal focusing 750 rpm
sample: La$_{2/3}$Sr$_{1/3}$MnO$_3$/SrTiO$_3$ - multilayer on NGO
sample-size: 4 $\times$ 4 mm$^2$
no focusing in sample plane
measurement time: 1 h
chopper frequency: 750 rpm / 1500 rpm
1. simulation of an instrument with 2 guide elements
   + check of options like polarisation, band-width filter, chopper

2. construction of the prototype instrument and tests on BOA
   + experiments with real samples
   + horizontal and vertical geometry

3. adaption of the design to the needs of the ESS
   splitting into
   - a horizontal soft matter instrument, and
   - a vertical hard condensed matter instrument for small samples

⇒ deliverables:
   - report on tests on BOA
   - complete simulation of the instruments for the ESS
optimised for liquid/air interface
⇒ horizontal sample plane, large $q_z$-range with one setting

optimised for short counting times
⇒ no use of long wavelengths
⇒ conflict short vs. long instrument!

GISANS focusing to the detector in the sample plane
compatibility with selene-concept has to be checked!
(astigmatic focusing might spoil the correction for coma aberration)
aim for small samples ($< 10 \times 10 \text{mm}^2$)

⇒ strong focusing to the sample in the sample plane

⇒ initial aperture of $1 \times 10 \text{mm}^2$ ideally!

variable resolution (1 to 20% required):

⇒ variable sample-detector distance (to tune $\Delta \alpha$)
  moderate source/detector distance (30 to 50 m)

or use a multilayer monochromator to get an angle/wavelength encoding for high resolution

  (no chopper, Frédéric’s REFocus approach)
  – TOF gives off-specular resolution
  – ML gives specular resolution

(to be evaluated)
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