

# The Simulations Guideline

## for the CREMLIN+ guide project

v1.1

This Guideline is to ensure easy comparison and cross-reference between all simulations carried out by the project partners.

1. Our initial task is to investigate the optimized guide transmission from source to sample taking into account neutrons useful for the particular instrument.
2. During the first phase of the project all guides are simulated independently from each other. Additional restrictions due to neighbours will be investigated later on.
3. Each instrument should be simulated on three cold sources, namely:
  - HEC3 LD<sub>2</sub> source
  - HEC2 LD<sub>2</sub> variant source
  - HEC2 pH<sub>2</sub> variant source

HEC stands for horizontal experimental channel, or beamtube. As the guide transmission function is independent from the source spectrum, only source geometry is relevant for our current task. The necessary values can be found in the table 1.

4. Supermirror reflectivity profiles to be used are based on the modern state-of-the-art technology. Proposed parameters are:  $R_0 = 0.99$ ,  $Q_c = 0.0218 \text{ \AA}^{-1}$ ,  $\alpha = 3.3 \text{ \AA}$  and  $W = 0.003 \text{ \AA}^{-1}$ . Maximum  $m$  value to be used is 7.

Source	Dimensions	Distance to optics, m
HEC3 LD <sub>2</sub>	12×20 cm <sup>2</sup>	1.82
HEC2 LD <sub>2</sub>	$D = 31.5$ cm	2 (optional 1.5 and 2.5)
HEC2 pH <sub>2</sub>	3×3 cm <sup>2</sup>	2 (optional 1.5 and 2.5)

Table 1: Input data for three different sources. Note that HEC2 LD<sub>2</sub> source has circular shape.

5. All instruments should be simulated for the guide length of 60 m. Direct line of sight should be eliminated within the first 22 m from the source surface. Guide dimensions (width and height) may be chosen freely.
6. The instrument models, once revised after the 2020 autumn NCAC meetings, should stay fixed across all guide simulations.
7. The final simulations result should include:
  - (a) geometrical description of optimized guides for three different sources;
  - (b) brilliance transfer for each of the guides;
  - (c) spatial and divergence profiles for different parts of the spectrum at the guide exit (for each of them).
8. All used models and results should be stored in the git repository.