TITLE and type of activity (Networking, Joint Research development):

Standards for Low Background Sample Environment at Scattering Facilities

Proposer: ELB

Partners: PSI,ISIS,ILL,FRMII??,HZB??

Estimated budget (in person months, other direct cost) and tentative distribution per partner

Abstract of your innovative activity: *(please make sure that you mention the following points)*

The signal to noise ratio is the decisive factor over the success of many neutron scattering experiments. Cryostats, furnaces, magnets, pressure cells, humidity chambers, electric field cells, rheometers, etc. and their combinations are the most commonly used and demanded sample environment.

Most European facilities have improved their instrument suites and sample environment has become a limiting factor in neutron experiments. The access to extreme conditions usually results in an increased background signal due to extra material in the beam path and restrictions in the available scattering configurations. We propose to investigate this issue altogether with the aim to adopt the most appropriate solutions to cut the background contribution as much as possible.

Approaching this problem from the other side, one can also maximize the signal to background ratio by choosing the optimal sample size and containment or fine-tune the scattering conditions utilizing in-situ sample manipulation. For example, the possibility to realign the sample within a cold cryostat avoids time consuming warming and cooling procedures thereby increasing the efficiency of beam-time usage.

All proposing partners are working to some degree on these topics. There are many individual solutions to the same problem. We propose to undertake a collective effort to single out the commonalities, explore the potential and technical limits of these solutions and develop new concepts for sample environment and work together towards solutions that can be shared amongst the facilities. This would lead towards a basic standard for sample environment, which improves the accessibility and fosters the mobility of users between the European scattering facilities.