

ESS Instrumentation Task: Work packages October 2000 – August 2001

WP #1. Specifying the neutron source parameters for the various possible moderators on the various target station options to be used in the instrument performance evaluations.

This task involves of agreeing on a set educated guesses in collaboration with the moderator-target team and external advisors to provide a realistic basis for instrumental considerations. These guesses will have to be based on partial and often contradictory data available in the literature, primarily from ISIS, LANL, SNS, the work of the Hokkaido group. Detailed, within some +/- 25 % reliable source neutron parameters, either based on sufficiently detailed Monte Carlo calculations or on experimental benchmarks from the Jessica project, will not be available within some 2 years, in view of the early stage of these studies. The neutron parameters of the various moderators will be characterized by simple analytical approximates describing the target-moderator neutron pulse response to an infinitely short proton pulse. In schematic terms, the neutron pulse FWHM length, rising time, decay time constant, time integrated intensity have to be defined as a function of wavelength.

The types of moderators to be considered:

Ambiant water: de-coupled poisoned, de-coupled un-poisoned, coupled

Liquid hydrogen: de-coupled poisoned, de-coupled un-poisoned,
"fully extended premoderated" coupled

Composite (water + hydrogen): de-coupled, premoderated coupled.

Differences between moderators on different target stations are to be considered.

Deadlines: 30 October 00: definition of the parameters required, type of approximate models

31 December 00: final approximates defined.

Organization: the ESS Task Leaders for Target-Moderator system and Instrumentation

WP #2. Assess the opportunities for generic instrument groups on the ESS and determine the optimum target station combinations. The comparison of instrument performance on the low frequency short and long pulse target stations is a priority.

For this purpose an Instrumentation Task Group will be established with teams formed to address issues relating to generic instrument groups as follows:

Powder Diffraction

Chopper Spectrometers

Crystal Analyser Spectrometers and High Resolution Backscattering

Neutron Spin Echo

Small Angle Scattering

Reflectometry

Single Crystal Diffraction and Protein Crystallography

S(Q) determination
Engineering

Quantitative evaluation of the performance of this generic set of neutron scattering instruments will be completed for 3 target station options: a) 5 MW average proton beam power in 50 Hz, 1 μ s short pulses, b) 1 MW average proton beam power in 10 Hz, 1 μ s short pulses, and c) 5 MW average proton beam power in 16.6 Hz, 2 – 2.5 ms long pulses. This will involve comparing simulated data from model systems. Comparisons should also be made with existing instrumentation in order to assess the new opportunities and scientific impact.

Deadlines: 17-18 October 00: kick-off workshop
28 February 01: preliminary results for a first round of discussion
20 April 01: final comparative results compiled
Organization: ESS Instrumentation Task Leaders

WP #3. Evaluation of potentials of ESS for applications other than neutron scattering: fundamental physics, nuclear physics, muon-resonance, radiography, tomography, irradiation, etc.

According to the ESS terms of reference, opportunities for these applications should be maintained, without including this set of applications in the optimization criteria of the basic source parameters. An informal working party of expert from the various fields concerned will be convened to evaluate new opportunities of this kind.

Deadlines: 28 Feb. 01: creation of a working party to address these questions
30 Sep. 01: preliminary results for a first round of discussion
20 April 02: final report compiled
Organization: to be initiated by the ESS Instrumentation Task Leaders

WP #4. Identification of instrument R&D needs (components, methods, data analysis) in enhanced interaction with the user community.

This goal will be achieved by the combination a several approaches:

- a) The Instrumentation Task Group defined under WP #2 will also identify technological challenges posed by the construction of optimized instruments and further work which will be required, such as background measurements, Monte Carlo simulations etc..
- b) The ESS MoU partners and organizations of the European neutron scattering community will be consulted for their suggestions and needs.
- c) Instrumentation workshops will be organized with broad, open participation to harvest the input from the broader neutron community. Workshops in preparation until June 2001: Neutron Spin Echo spectroscopy (October 00), Moderator-instrument workshop (March 01), Detector workshop (tentatively April 01).

Deadline: 31 August 01: report on R&D needs to be addressed in the time frame Sep.2001- May 2003 and proposals for further instrument workshops.
Organization: ESS instrumentation task leaders

Resources:

i. Contributions in kind from MoU Centres and neutron scattering centers associated with the instrumentation task (ILL and LLB)

Staff Effort

Instrumentation Task Group and consulting MoU partners	40 x 10 % = 4 FTE
Task Leader & Deputy	2 x 25 % = 0.5 FTE
Assistant (Gutberlet)	1 x 50 % = 0.5 FTE
HMI-FZJ ESS project	4 FTE

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Total: 9 Full Time Equivalent

Travel expenses for staff attending meetings

Cost of hosting the meetings

ii. Expenses incurred from the central ESS budget

Travel and subsistence expenses incurred by invited members of the task group.