Workshop summary on targets and moderators

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Two subjects have been discussed quite in detail at this session:

1. The neutronics performance of the LANSCE-target/moderator system by Grady Hughes and Jim Gilmore (LANL), and
2. the cold-neutron D_2 source at SINQ by F. Atchison (PSI).

For the LANSCE target system, a very detailed Monte-Carlo mockup has been set up. The fluxes for neutrons at 1 eV have been calculated in absolute terms, i.e., $\frac{n}{cm^2 \cdot p}$ for various flight paths.

Furthermore, using activation technique, the fluxes have also been measured. Remarkable agreement has been achieved as is shown in the following table:

Flight Path	Detection Distance (cm)	Measured $\frac{n}{cm^2 \cdot p}$ at 1 eV	Calculated $\frac{n}{cm^2 \cdot p}$ at 1 eV
1	3175	4.4×10^{-10}	4.95×10^{-10}
3	900	5.2×10^{-9}	6.17×10^{-9}
7	1300	2.61×10^{-9}	2.71×10^{-9}

In view of the complicated geometry of the LANSCE system, this agreement is satisfactory, indeed. Consider that this system consists of a split tungsten target with moderators the height of the target gap in slab arrangement, embedded in a nickel reflector.

The essential points of these results are the following:

- The fluxes per proton are more or less the same as those given for IPNS and ISIS, which both have uranium targets and moderators in wing-geometry. Hence, it seems, that the higher source strength of the uranium target is compensated by the stronger coupling of the moderators in slab arrangement. In the LANSCE system, the moderators view the target void.

Hence, there is some hope that the background will be as low as for the other systems. This remains, however, still to be shown.

- The SINQ D_2 cold-neutron source is a typical installation for a steady-state neutron source. Dimensions and design are, therefore, hardly different from a reactor source. The basis of the design is an adaptation of the horizontally-mounted thermosyphon as used for the second cold-source at the ILL, Grenoble.
- An essential aim in the design of the cold source for SINQ is to exploit the advantage of the lower heating of the vicinity of a spallation target. Therefore, special considerations of several items are worthwhile:
  (i) material distribution and flux optimization (e.g., re-entrance hole);
  (ii) cryogenics and thermohydraulics; and
  (iii) shielding and induced activations.