ICANS-XIII
13th Meeting of the International Collaboration on
Advanced Neutron Sources
October 11-14, 1995
Paul Scherrer Institut, 5232 Villigen PSI, Switzerland

SUMMARY OF THE SESSION ON SOURCE CONCEPTS

Rex P. Hjelm, Neutron Scattering Center, Los Alamos Neutron Science Center, Los Alamos National Laboratory, Los Alamos, NM 87545 USA

The session on source concepts had contributions dealing with long (LPSS) and short (SPSS) pulsed neutron spallation sources, as well as a proposal for a new reactor facility in Canada.

Ferenc Mezei started off the session with a discussion of the relative merits of LPSS and SPSS sources in "Complementarity of LPSS and SPSS Facilities". His conclusion was that an SPSS is best for high resolution neutron scattering, using the slowing down spectrum of thermal or cold moderators, while an LPSS is more effective for work that uses fully moderated thermal or cold neutrons. His arguments were based on the need to match the time structure of the proton pulse with the response of the moderator-reflector (MR) system, the resulting penalties of this on the total and peak intensity of the moderated neutron pulse of an SPSS, and on cost considerations. He pointed out that the realization of the full potential of the LPSS concept would require new concepts in instrument design, which if successfully implemented would likely remove the need for a low resolution SPSS target station.

Roger Pynn with Luc Daemen of Los Alamos in "Long-pulse Spallation Sources in Perspective" continued the discussion of the relative merits of LPSS and SPSS. They expanded on the argument that matching proton pulse time structure to MR system response leads to intensity penalties for an SPSS. This factor and consideration of SPSS and LPSS instrument frequency responses lead them to conclude that an LPSS is may be a better option than an SPSS for lower resolution scattering measurements. They also reviewed the conclusions of a recent workshop on LPSS instrumentation held at Lawrence Berkeley Laboratory that there are a number of cold neutron spectrometers and diffractometers that could be build at a 1 MW LPSS that would match or exceed the performance of the best instruments available.

Details of the design and performance of the Los Alamos concept for the target-moderator-reflector system for a 1 MW LPSS was presented in "LANSCE LPSS Target System Neutron Performance" by Eric Pitcher, Gary Russell and Phil Ferguson. The reference design is a split tungsten target, with three cold (liquid hydrogen) moderators. Two of the moderators are in wing geometry and one in flux-trap geometry, giving six viewed moderator surfaces. The optimized 10 x 10 cm upstream wing moderator with an all beryllium reflector gave fluxes about one-quarter of those from CS2 cold source at the ILL over a wavelength range above 2 Å.

Plans are afoot for a new reactor source to replace the aging Chalk River facility. Although the primary purpose of the new facility is for reactor materials and fuel element research, the "Proposal for a New Research Neutron Source in Canada AEC" described by Tom Holden will be outfitted with tangential neutron beam lines and two cold neutron source inserts. Present plans call for six guides to transport the beam from one of the cold inserts to an experimental hall. The reactor has a concentrated, split core design for high uniform irradiation near the core center ($\phi = 2\text{-}3 \times 10^{14}$ n/cm^2/s).

The session ended with two papers describing LINAC upgrades and the construction of a compressor ring to service the new neutron research facility, IN-06, at the Moscow Meson Factory. The LINAC upgrade was described by L.V. Kravchuck in "Proton linear Accelerator for Pulsed Neutron Research". Presently the LINAC produces a beam with an energy of 100-130 MeV and 17 mA peak current. The completed LINAC will give a 700 MeV beam with a peak current of 50 mA and a 0.34 duty factor. LPSS operation of the water cooled uranium target at IN-06 is expected in 1996 using a 500 MeV proton beam. SPSS operation of the facility is planned with the completion of a compressor ring in 1998 as described by M.I. Grachev in "Proton Storage Ring for IN-06 Pulsed Neutron Source". With the ring the IN-06 target is anticipated to produce neutron pulses with a peak flux of 5×10^{15} n/cm^2/s over 35 μs, at 50 Hz, with an average flux of 8×10^{12} n/cm^2/s.