Summary of the Plenary Session

Reports of Status of Spallation

Neutron Source Projects

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This session showed the growing world-wide interest in steady, quasi-steady and pulsed spallation neutron sources. The six projects on which we heard status reports ranged from those which are in the process of conceptual design, to those which have been completed, with one, the ZING-P' prototype, already shut down after accomplishing its purpose. The table lists the projects, the characteristics of the sources, and their status. The TRIUMF project is included in the table for completeness, although no report was given in this session, since there have been no recent new developments since the ICANS-III meeting. The detailed reports from each laboratory should be consulted for further information.

Spallation Neutron Source Projects

Laboratories	Source	Location	Characteristics	Status
KEK	KENS	Tsukuba, Japan	500 MeV protons Synchrotron (shared) 2μA, pulsed 20 Hz, τ_s=0.1μs W target CH_2 and Solid CH_4 moderators.	Completed June 1980
LASL	WNR	Los Alamos, USA	800 MeV protons Linac (shared) 6μA, pulsed 120 Hz, τ_s=8.μs W, Ta targets.	Completed '77
	WNR/PSR		800 MeV (H^- injection) LINAC-storage ring (shared) 100μA pulsed 12 Hz, τ_s=.27μs	Full instensity 1986
ANL	ZING-P'	Chicago, USA	300 & 500 MeV protons (H^- injection) Synchrotron 8μA, pulsed 30 Hz, τ_s=0.1μs U Target	Startup 1977, closed 1980
	IPNS-I		500 MeV protons (H^- inject.) Synchrotron 22μA, pulsed 45 Hz, τ_s=0.1μs, U Target, Liq. H_2 and CH_4 moderators.	Startup 1981 Full current ~1983
	IPNS-II		800 MeV protons (H^- inject.) Synchrotron 500μA, τ_s=0.2μs 60 Hz, pulsed	Decision deferred
Rutherford - Appleton Lab	SNS	Chilton, UK	800 MeV protons (H^- inject.) Synchrotron 200μA, pulsed 50 Hz τ_s=.27μs U Target	Low current 1983 Full intensity 1986
KFA	SNQ	To be determined	1.1 GeV protons Linac 5mA, quasi-steady 100 Hz, τ_s=500μs Lead or Liq. Pb-Bi target Options: add H^- compressor ring	Design study to be completed early 1981 project completion ~1991
SIN	TNS	Villigen, Switzerland	600 MeV protons Cyclotron 1-3 mA, steady Liq. Pb-Bi target	Full Current 1986
TRIUMF	TNF	Vancouver, Canada	600 MeV protons Cyclotron 140μA, steady Liq. Lead target D_2O & H_2O moderators. Option: quadruple current.	Completed 1976

Most of the reported design and construction activity seems at this stage to be devoted to the sources themselves rather than instruments. This probably reflects the facts that the sources require the longer time to design and construct and that commitments on instruments can be held for later to make possible the needed evaluation of new concepts and development of new components in instrumentation. Nevertheless, instruments appear to come on line with the completion of the sources. Some exciting instrumentation developments are appearing to exploit the characteristics of the new sources. Instruments on the operating sources are already providing new scientific results.

Each project addresses a different mix of applications, according to the capabilities and needs of the community served. While the primary applications discussed in this meeting were neutron scattering (and in the case of IPNS, fast neutron radiation damage) research, other applications of these installations were also discussed. A partial list includes medium energy (meson) physics, muon spin resonance, pion therapy, neutrino physics isotope production and nuclear physics. Most of these applications are mutually exclusive, thus require time sharing of the primary accelerator beam.

In earlier meetings, we were in many cases grouping for factors of two in evaluating source parameters, and quite ignorant of some important questions. Now we are asking for accuracy at the level of, say, 20%, and have identified and quantitatively answered many more important questions than before. At the same time, we have begun to get gratifying scientific results from some of the new instruments and are becoming able to assess more convincingly the scientific productivity of spallation neutron sources.

This steady progress is the coming to fruition of the new generation of advanced neutron sources.