

## Report of an IUPAP Special Meeting on Neutron Sources

### Introduction

A meeting on the Future of Neutron Sources was held in Budapest on September 1, 1999, bringing together the Chairs of IUPAP Commission C5, C6, C8, C9 and C10, the Chairs of the neutron scattering associations of Europe, North-America and Japan, representatives of existing neutron scattering facilities and of facilities under construction and in various stages of planning and a few guests. The purpose of the meeting was a discussion of the need for new sources, up-grades to existing sources, availability, access, instrumentation requirements, long-range planning and international coordination. This meeting was the second one on these issues, following the meeting in Los Angeles on March 15, 1998. The participants agreed that the observations, statements and conclusions made in the report of the Los Angeles meeting still apply. The same is true for the report of the OECD Neutron Sources Working Group. It was also noted that there are no differences on all relevant issues between these reports. The main recommendations of the second of these reports are repeated:

- to maintain, as far as appropriate, existing national sources, noting their importance for maintaining local neutron-scattering infrastructure;
- to maximise the utilisation of current front-rank facilities, noting their potential for refurbishment and up-grading which can lead to substantial increases in performance and efficiency;
- to prepare for provision of next-generation regional sources, noting the long lead times involved and the necessity to ensure that governments are appropriately informed of future proposals.

It was also recommended that consideration should be given to the establishment of a global network, a follow-on body to the Neutron Sources Working Group.

### User Communities

The reports of the Chairs of the user communities in the three major regions Europe, North America and Asia/Pacific showed clearly the increasing demands for experiments with neutrons. The largest community exists in Europe. In general, there is a large over-subscription of instruments. There is agreement that both continuous reactor sources and pulsed spallation sources are needed and will be needed in the future. The two types of sources complement each other. The importance of smaller national sources was noted, in particular for educational purposes, for the involvement of university groups in designing new instrumentation, and for method development. Small institutions play an important role for the development of expertise and for industrial use. The lack of sufficient training of people who can build new sources and instruments is particularly noted in North-America.

### Up-grading of existing facilities

The up-grading of existing facilities is a very important program to fill at least part of the upcoming neutron gap. Such programs exist in the three regions. For instance, Taiwan is refurbishing an existing reactor and in the United States old instruments are being replaced and new ones are being added. The same applies to the two major European facilities ILL and ISIS. There is considerable potential for this up-grading. At ISIS there is a strong ongoing program to replace and to add new instruments and to increase the proton current. There is

also a detailed plan to add a second target station in the near future with attractive new possibilities for the users. The program of up-grading instrumentation at ILL can be further improved by additional funds, in order to fully use the potential of the existing reactor.

### **New developments**

Since the last meeting in Los Angeles (1998) important new developments have taken place. In the United States it has been decided to build the Spallation Neutron Source (SNS). This together with the instruments upgrades and the addition of new instruments under way will improve the availability of neutrons substantially in this region. The expected time for the SNS to start operation is the year 2005. In Canada the NRC has endorsed a project for a Canadian Neutron Facility.

For the Asia/Pacific region the prospects for the future have also improved. The construction of a new reactor has been approved in Australia. In Japan two earlier projects for spallation sources have been joined: a third-generation spallation source is expected to be funded early in 2000 and a first stage will be operational in 2005.

In Europe the construction of the Munich reactor is on schedule so that the start of operation is expected at the beginning of 2001. It is a national source which will serve as a basis for international collaborations. It was observed that the program for instrumentation is not sufficiently funded to make full use of the potential of the reactor. On the larger European scale the prospects for the future are, however, not as bright as in the other two regions. Without further action in the near future, Europe will lose its leading role, since the number of facilities is expected to drop from 16 at present to 4 in the year 2020. Even with the upgrades to existing sources and the completion of the Munich reactor, the European research will face a difficult period ('neutron gap') after the year 2005. There are two proposals in Europe offering an intermediate solution: The AUSTRON spallation source and ISIS 2. The first one is proposed by Austria which is prepared to contribute 1/3 of the cost and is seeking other countries as partners.

The high standard in Europe can, however, only be maintained if the ESS is realised. After the publication of the technical study in 1997, the R+D phase has been started to which partners from 13 countries contribute. For the engineering design a sound financial basis has to be established. So far there are no decisions by the European government funding agencies and/or by the EU about the construction of the ESS; a positive decision is needed in the near future to put research with neutrons on a new scientific level at the end of the next decade. The ESS, together with the new spallation sources in the U.S. and in Japan and the new reactor projects mentioned above, are needed to ensure high level research with neutrons and to avoid the neutron gap.

### **Further remarks**

It is noted that many international collaborations exist to develop instrumentation and components of the high-power sources. This approach of sharing of expertise is strongly encouraged. Discussions on issues of access to facilities according to the rules set out by IUPAP showed that in most cases there are no problems. However, free, merit based access may become problematic at some institutions in the future. It was agreed to have another meeting in the year 2000, which will be held in Japan in conjunction with the International Conference on Advanced Neutron Sources. At that meeting it should be decided whether it is useful to establish a forum on the issues of neutron sources and whether IUPAP should play an active role.

Rudolf Klein

## **List of participants**

H. Godfrin, Chair IUPAP Commission C5

M. Cardona, Chair C8

H. Yasuoka, Chair C9

W. Petry, Member of C10, replacing F. Parak, Chair of C6

A. Furrer, European Neutron Scattering Association

Y. Fujii, Neutron Scattering Association of Japan

J.J.Rhyne, Neutron Scattering Society of America

D. Dubbers, Director ILL

U. Steigenberger, ISIS

J. Kjems, Chair of Scientific Council of ESS

S. Ikeda, KEK

Y. Endoh, JSNS

W. Gläser, Munich Reactor

M. Collins, Canada (CINS)

M. Regler, AUSTRON

D. Richter, OECD Report

N. Kroo, Member of ESF Standing Committee for Physical and Engineering Sciences

R. Klein, Chair of the meeting