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*ENSA*

European  
Neutron Scattering Association

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## **The European Spallation Source**

A Statement by the  
European Neutron Scattering Association  
(ENSA)

March 1998

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## Executive Summary

The European Neutron Scattering Association ENSA is a forum of representatives, each nominated by the seventeen National Neutron Scattering Societies within Europe. Each National Society is a formal confederation of researchers who use neutron scattering methods as a tool in their scientific endeavours. An estimated 4'400 researchers are represented, via their National Societies, by ENSA.

Following extensive presentation and consultation exercises conducted by the National Societies with their members, at the request of the European Science Foundation (ESF), a large majority of European researchers have expressed their support for the building of the European Spallation Source (ESS) as being the best option to both satisfy their research needs in the future and to maintain the leading position which Europe has enjoyed globally in this field for 25 years. A digest of the National statements is included in Annex 1 and the individual National statements are presented in their entirety in Annex 2.

*ENSA therefore, in its representative capacity, recognising:*

- the specific power of neutron methods for the study of condensed matter covering many disciplines; and
- the relevance of microscopic information - structural, dynamic & magnetic - on a wide range of materials from pharmaceuticals, through catalysts, to superconductors, to the competitiveness of European industry; and
- the benefits of strong intra-European co-operation in maximising value for money for the European tax-payer; and
- the predicted decline in operational neutron sources over the next decade as presented by the OECD; and
- the pre-eminent position of Europe in neutron scattering techniques and utilisation, which is now threatened by American & Japanese initiatives; and

- the benefits of world-leading Centres of Excellence for the training of the highest quality scientific and technical manpower to underpin Europe's economic future in an increasingly competitive world,

*therefore wishes to express its formal position as follows:*

- The European Spallation Source represents the best solution for future neutron scattering needs within Europe and ENSA strongly & unequivocally supports a positive commitment to construct it, immediately following the completion of the present R&D phase.
- Operational high flux facilities within Europe, notably ILL & ISIS, must be upgraded to fully utilise the potential of their capital investment, to maximise scientific productivity and to prototype instruments for ESS.
- Operational medium flux facilities within Europe, as well as fulfilling their principal purpose of providing high class equipment for National measuring needs, act as nurseries for the higher flux facilities, not only serving as training grounds for new young researchers but enabling prototype instrumentation and test experiments to be proven, and the future viability of these sources must be assured.

Upon these three foundation stones the future of this powerful technique will be secure. ENSA therefore urges political and scientific authorities within Europe to act both at National and International levels, working with urgency towards a positive decision on the European Spallation Source.

## Annex 1

### A Digest of the Statements made by National Neutron Scattering Societies on the ESS

The *Austrian* Neutron and Synchrotron sources Committee “strongly supports the ESS project” on the grounds of the foreseeable future shortage of neutrons and the complementarity of reactors and pulsed sources, and points out that the accumulated know-how from the AUSTRON project “could lead to a valuable contribution to the ESS project”.

“The Board of the *Belgian* Physical Society (Société Belge de Physique - Belgische Natuurkundige Vereniging) has discussed the situation of neutron scattering in Belgium. Given the importance of neutron scattering, the Belgian Physical Society will support strongly all activities which will give Belgian Scientists access to neutrons, now and in the future. In particular, we will provide all possible support to the plans of a European Spallation Source for Neutrons”.

"The *Czech* neutron scattering community strongly supports the building of the European Spallation Source. It will open new possibilities for its research activities in the future on a higher level."

The ESS project “was positively received by the *Danish* Natural Science Community” and the Danish Neutron Scattering community supports the ESS - A Next Generation Source for Europe.

“The *French* community is very anxious .... about the orientations that CEA and CNRS will take on the future of the Reactor Orphée in Saclay. More recently, troubles have happened about the financial support of CNRS to ILL. As far as long term is concerned, spallation sources appear as the only way for very intense neutron sources. The ESS is therefore supported as it will undoubtedly open new research fields for neutrons", but it should be kept in mind that "reactors and spallation sources are complementary. Within their present experience, French neutron users have proven the efficiency of spallation sources in a certain number of fields, while reactors appear more appropriate for several kinds of studies. The French community emphasizes the need to maintain .... national sources .... for specific research, training, and also to bring the users at the top level needed for an optimal use of European facilities."

The **German** Committee for Neutron Research (KFN) has produced a detailed case for support of the ESS, stating “A modern 5MW spallation source like the ESS produces peak fluxes which are about a factor of 100 above the average flux of high flux reactors. Together with new instrumentation such a source would allow the development of new areas of applications for neutron research and would maintain the leading role of European research in this field”. Referring to thriving plans in the USA and Japan, they say “In all continents one has thus reached the conviction that the future of neutron research is with spallation sources”. “The KFN supports strongly all efforts to create a next generation neutron source in Europe in constructing the European Spallation Source (and) states that, with the ESS, the decisive step towards the future of neutron scattering beyond the ILL is taken”.

“The **Hungarian** neutron scattering community strongly endorses the general concept of the ESS and urges its timely realisation early next century. To this end it wishes to be fully involved in the forthcoming R&D phase. The Budapest Neutron Centre with its developing and rapidly growing user community serves as a national and regional basis for integration to the European neutron research community and towards the future ESS”.

The Societa **Italiana** di Spettroscopia Neutronica is “aware that in the next decade, because of fast ageing of present neutron sources, maintaining and renewing most of the European neutron sources will be an increasing need and moreover it will be mandatory to develop and realise new sources like ESS for maintaining to European Research the world leadership in this strategic field. The final definition and funding of the ESS project .... is the only chance Europe has at present in order to ensure a real future of neutron scattering in the starting decades of the next century. The members of SISN therefore .... bring to the attention of the funding agencies the extremely important role of the ESS project and the necessity of the official participation of Italy”.

The *Nederlandse* Vereniging voor Neutronenverstrooiing stated that “for a healthy future of the neutron scattering research in the Netherlands it is necessary that 1. The Netherlands has a home base with a good infrastructure ..... 2. Access to a large international facility is guaranteed and 3. A new generation neutron source will be realised”. The NVNV emphasises the synergy of the three elements above and emphasises that “for the progress of science, one should always strive for the best possible experimental facilities. This will lead to extra impulses in the broad range of scientific areas where neutrons yield unique information. The candidate for a new generation neutron source is the ESS. NVNV strongly supports this initiative”.

“The *Norwegian* neutron scattering community .... is aware of the threatening neutron drought and supports technically and morally the plans to build ESS”. However, “the economic support for ESS must be decided by NRC (which) is in financial trouble and wants to detract from participation in several European Large Scale Facilities, like CERN”.

“The *Polish* neutron community fully supports the European Spallation Source Project ESS - and would like to participate actively in the developments”.

“The Directorates of (eight national) institutes, together with the members of the *Russian* (neutron) scattering community are unanimous in their opinion of the necessity to support the ESS project. They consider ESS as an extremely timely project which must be realised. For Russian (neutron) scatterers it is a very important project from the point of view of both opening new scientific horizons and providing a means for further integration of Russian scientists into (the) European scientific community”.

After discussions between the different *Spanish* partners, including the Spanish Association of Neutron Scatterers, the CSIC and CIEMAT research establishments and two large engineering firms with relevant experience of collaboration with several large scale experimental facilities in Europe “see participation in ESS as an important strategic option for the middle-term future .... and the Centre de Investigaciones Energeticas, Medioambientales y Technologicas (CIEMAT) .... acting as a co-ordination centre .... has the power and the will to sign the MOU (thus securing) Spanish participation on the ESS R&D phase”.

“The *Swedish* Neutron Scattering Society would like to express its standpoint as: The Swedish neutron users are positive to ESS and think it is the best possible solution for a future high performance neutron source in Europe. However, .... ESS is THE answer to the future demand of neutron scattering PROVIDED that it is supported by a network of smaller facilities. ESS on its own would be a waste of money. Simply upgrading existing sources and improving instrumentation is important, but cannot provide some of the technique/application breakthroughs that will be provided by ESS together with improved instrumentation”.

“The *Swiss* neutron user community is steadily increasing, and consequently the demand for neutrons continues. Therefore appropriate actions have to be taken in medium and long terms both on a national and on a European level. The existence of a home base for neutron scattering is considered to be essential. In Switzerland this is guaranteed by the spallation neutron source SINQ” which is a focus for “high quality neutron scattering applications, (ensures) the basic education and training of young scientists .... and constitutes a nucleus for the development of new instrumental techniques”. The Swiss Society for Neutron Scattering states that “the participation of Switzerland at European high-flux neutron sources is indispensable” and that “on the longer term, there is a clear need for an advanced European neutron source which will push the neutron scattering applications beyond their present limits. Today the European Spallation Source is the only project in Europe which fulfils these criteria”. In conclusion “the Swiss neutron user community supports the ESS project and is willing to actively co-operate in defining an optimum concept and the technical specifications for the instrumentation”.

The European Spallation Source project was received enthusiastically by the *United Kingdom* Neutron and Muon Users as a unique opportunity to keep European Scientists at the forefront in a wide range of scientific disciplines. It was agreed that the ESS is the best next generation neutron sources for the UK User Community and it is essential for the success of our future research that it is built as soon as possible”.

The above extracts are a digest of pertinent comments from the various National European Neutron Scattering Societies and should be read with the complete set of statements following, in order to be understood fully in context.



## Annex 2

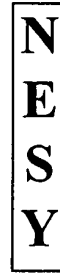
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**ÖPG-Fachausschuß  
FORSCHUNG AN  
NEUTRONEN- UND SYNCHROTRONSTRAHLUNGSQUELLEN**

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Dec. 15, 1997

Austrian statement concerning the ESS project:

The Committee „Neutron- and Synchrotron Sources“ (NESY) of the Austrian Physical Society has debated the ESS Project in the meeting of September 24, 1997.

The Austrian neutron user community strongly supports the ESS project:

1. because of the world-wide shortage of neutron sources in the foreseeable future,
2. because a European pulsed spallation source would be truly complementary to continuous neutron sources from reactors such as at ILL or Munich.

Moreover, the Austrian community points out that a certain amount of know-how has been accumulated in the course of the feasibility study for the AUSTRON project, which could lead to a valuable contribution to the ESS project.

With best regards

Prof.Dr/ Falko Netzer

SOCIETE BELGE DE  
PHYSIQUE  
ASSOCIATION SANS BUT LUCRATIF

BELGISCHE NATUURKUNDIGE  
VERENIGING  
VERENIGING ZONDER WINSTBEJAG

VOS  
LW REF.

NOS  
ONZE REF.

Dr.A.FURRER, president,  
European Neutron Scattering  
Association,  
Paul Scherrer Institut,  
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Switzerland.

VEUILLEZ ADRESSER TOUTE CORRESPONDANCE AU SECRÉTARIAT GÉNÉRAL  
GELIEVE ALLE BRIEFWISSELING AAN HET ALGEMEEN SECRETARIAAT TE RICHTEN

Ukkel, 23 December 1997.

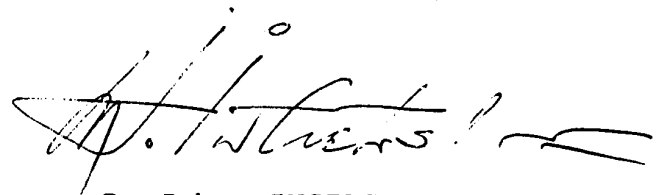
Dear Dr.Furrer,

The Board of the Belgian Physical Society (Société belge de Physique - Belgische Natuurkundige Vereniging) has discussed the situation of neutron scattering in Belgium.

There is no longer a source of thermal neutrons for condensed matter research in Belgium.

Given the importance of neutron scattering, the Belgian Physical Society will support strongly all activities which will give Belgian scientists access to neutrons, now and in the future. In particular, we will provide all possible support to the plans of a European Spallation Source for neutrons.

Yours sincerely,

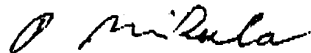


Dr.Johan INGELS,  
secretary-general,  
BNV-SBP (BPS).

## **Center for fundamental and applied neutron research Nuclear Physics Institute, Czech Academy of Sciences**

### **Statement of Czech neutron scattering community.**

Czech neutron scattering community strongly supports the building of the European Spallation Source. It will open new possibilities for its research activities in the future on a higher level. Having the governmental support, since the beginning of the last year 1997 there is a strong activity in the Czech community requiring the membership of the Czech Republic in ILL and within 1998 bilateral discussions with ILL representatives should begin. Even though, there is a medium power research reactor in Czech Republic (LVR-15 situated in Rez near Prague), at present it is able to satisfy only a small part of the community dealing mostly with an application of neutron scattering methods in materials research. Moreover, the operation life of the reactor LVR-15 is supposed approximately until 2005. Other members of the community dealing with inelastic scattering, structure and magnetic excitations etc. have already been performing their experiments abroad at high-flux neutron sources, which have always been connected with administration difficulties coming from the fact that the Czech community has not been a member of any related international institute. As the Czech Republic is expected to become a member of EU within the next few years, neutron scattering community believes that the Czech Republic will be a regular member with a corresponding participation at ESP.



Dr. Pavel Mikula

On behalf of the Czech neutron scattering community

The logo for Risø National Laboratory, featuring the word "RISO" in a stylized, outlined font within a black rectangular background.

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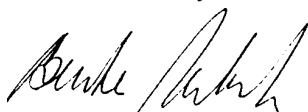
**Standpoint concerning ESS from the Danish Neutron Scattering Community**

Dear Professor Furrer,

On behalf of the Danish neutron scattering community I would like to inform you that the community support the European Spallation Source project described in "ess A Next Generation Neutron Source for Europe" volumes I, II and III.

The project has been presented and was positively received by the Danish natural science community at the yearly Spring meeting of the Danish Physical Society in June 1997. It was further presented and discussed by the Danish neutron scattering community at two occasions; the joint Risø-Studsvik-TMR user meeting in Stockholm, Sweden, in March, 1997 and at the meeting of the Danish neutron scattering community at Risø in September, 1997.

Yours sincerely

A handwritten signature in black ink, appearing to read "Bente Lebech".

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**A statement of the French Community of Neutron Users  
on the project of a European Spallation Source**

The Society of French Neutron Users (Société Française de la Neutronique) has organized several actions to inform the community and to know its opinion about the project of the European Spallation Source. Two years ago, during our annual meeting, we had a detailed presentation given by the promoters of the project. In the beginning of 1997, we made a broad distribution of a questionnaire to French neutrons users. Among other questions, we were asking about the opinion on spallation sources, their use, and the interest to the community for the ESS project. This questionnaire got more than hundred answers. The results were presented, and a large discussion was opened at our May 1997 national meeting. More recently, the ESS presentation documents were widely distributed with invitations to send us user's opinion on the new source (about 400 copies were sent). Few answers were received.

It is clear that the French community is very anxious at the present time about the questions concerning its near future and in particular, but not only, about the orientations that CEA and CNRS will take on the future of the Reactor Orphee in Saclay. More recently, troubles have happened about the financial support of CNRS to ILL. A new decrease in the total amount of fundings for large facilities has been decided this year.

As far as long term is concerned, spallation sources appear as the only way for very intense neutron sources. The ESS is therefore supported as it will undoubtedly open new research fields for neutrons. This is straightforward for time-of-flight experiments, high incident energies, broad dynamic range. Other domains will follow. It must however be kept in mind that, at the present time, reactors and spallation sources appear complementary. Within their present experience, French neutrons users have proven the efficiency of spallation sources in a certain number of fields, while reactors appear more appropriate for several kinds of studies: soft matter, in particular for small-angle scattering at long wavelengths, magnetism, crystallography.

ESS should not be developed at the expense of national sources. The efforts for the development of instrumentation at ESS must also be used to improve the possibilities of national sources in the domains of choppers, monochromators, detectors, *etc.* The French community emphasizes the need to maintain and improve national sources and their instrumentation for specific research, training, and also to bring the users at the top level needed for an optimal use of European facilities.

## Assessment of the European Spallation Source by the German Committee for Neutron Research

### I. Significance of Neutron Scattering

Modern material research, molecular biology as well as the scientific interest in an understanding of condensed matter on an atomistic scale demands complete knowledge of the positions and the motions of the atoms and molecules as well as their magnetic properties. For this type of research, the interaction of atoms with radiation is of greatest importance. Among the different kinds of radiation x-ray or synchrotron radiation and the complementary neutrons are the most significant.

The second volume of the ESS-report - scientific case- /1/ deals in detail with the perspectives and the future potential of the probe neutron in condensed matter research in solid state physics, in chemistry, in polymer and soft matter research, in biology, in earth- and environmental sciences and in engineering sciences. In addition there is great interest among the particle physic to investigate the neutron.

The findings of the ESS-report agree with a recent study of the European Science Foundation (ESF), where the future role of neutron research is evaluated /2/. The ESF standing committee for physical and engineering sciences (PESC) concluded: "*Neutron scattering techniques remain a vital resource for the structural investigation of condensed matter, including the solution of structural problems in the technical sciences and industrial developments*". In addition it is stated, "*synchrotron radiation techniques and radiation sources cannot abrogate neutron techniques and neutron sources (which would have been an appealing hope in financially constraint times with regard to the much lower specific costs of soft x-photon beams, compared to neutron beams)*".

The great importance of neutrons is contrasted by a world wide decreasing capacity of neutron sources. Presently, within the OECD countries and Russia about 26 larger neutron facilities are operational. Most of these sources base on reactors, which became critical in the late 50<sup>th</sup> or early 60<sup>th</sup> . Already for technical reasons, most of these sources will reach the end of their live time in the years between 2005 and 2015. In 2015 less than 1/3 of the presently existing neutron sources will still be operational and this includes already all existing spallation sources. On the other hand, world wide there exist about 6000 neutron users, 3500 of them in Europe, who need neutrons as one of their important research tools.

## II. The European Spallation Source (ESS)

In order to secure modern and efficient neutron scattering in Europe beyond the year 2010, first efforts were undertaken in the frame of the EU (Large Facility Program). In the years 1991/1992 an initiative of the Research Center in Juelich and the Rutherford Appleton Laboratory in Didcot brought together a number of workshops, where propositions for a pulsed European Spallation Source were studied. These workshops resulted in a proposition to perform a two year site independent feasibility study for such a source. This study started in december 1994 with the participation of 7 European countries and 12 institutions. It was funded by the European Union with 2 MECU.

This multinational study dealt with a reference design for the European Spallation Source, comprising a 1.3 GeV LINAC, delivering an average proton current of 3.78mA. The resulting target power amounts to 5MW. The millisecond pulses of the LINAC are compressed by two compressor rings and than delivered to 2 target stations operating at 50Hz and 10Hz. There the spallation neutrons for research are produced.

For the two target stations liquid metal targets with mercury are suggested. Its choice bases on the good neutronic properties of mercury and on the avoidance of the very important radiation defects which would occur in a solid target material like tantal or tungsten. Furthermore, such a liquid target has the larger potential for even higher power.

The study resulted in an estimated final costs of 935 MECU  $\pm$  20% for the complete project including instrumentation on the green field.

The two years feasibility study was completed in 1997 with a three volume report which demonstrated the physical and technical feasibility of the 5MW pulsed spallation source. This study also identified areas, where research and development work could produce important improvements compared to the present state. In particular it was suggested to perform the following R+D work with high priority.

1. Accelerator: Developments for pulsed superconducting accelerator components for the LINAC are of high priority. Furthermore, work to minimize the beam losses in order to achieve "*hands on maintenance*" for the accelerator is very important.



2. Target: Investigations of radiation damage and shock waves which are produced by the pulses within the target and the target windows have to be performed. Furthermore, an optimialisation of the neutron fluxes within the target station for optimized use needs to be done.

3. Instrumentation: New techniques and optimized instruments should be developed. In particular those instruments need to be reconsidered, where today continuous sources still provide better opportunities than pulsed sources.

In order to carry out these R+D work, five European research centers from five different European countries have concluded a memorandum of understanding. The following institutions have signed.

- the Rutherford Appleton Laboratory (Britain)
- the National Laboratory in Risø (Denmark)
- the CEA (France)
- the PSI in Villigen (Switzerland)
- the Forschungszentrum Jülich (Germany)

The memorandum of understanding is open for further contributors and negotiations are undertaken in different directions.

### **III. The ESS within the national and international Research Frame**

In Germany three neutron sources with medium flux density all based on reactors (FZJ, HMI, GKSS) are operational. Recently the construction of a further continuous source (FRM-II in Munich) was commenced, in order to avoid national neutron gap which in view of the limited live time of existing sources could be envisaged for the next decade. With the FRM-II, similar as with other high flux reactors like the ILL, Grenoble, the limit for neutron fluxes from reactors is reached.

On the other hand a modern 5MW spallation source like the ESS produces peak fluxes, which are about a factor of 100 above the average flux of high flux reactors. Together with new instrumentation such a source would allow the development of new areas of applications for neutron research and would maintain the leading role of European research in this field.

Presently a number of smaller (< 160KW) pulsed neutron spallation sources are operated in America at the Argonne National Laboratory and in Los Alamos, in Japan at KEK and in Europe at the Rutherford Appleton Laboratory. The first source with 1MW beam power, however not pulsed, became opera-

tional in december 1996 at the PSI in Switzerland. The construction for a 1MW pulsed spallation source, a concept of which is close to the ESS, is planned for 1999 at the Oak Ridge National Laboratory in the United States. In Japan a decision on the construction of the Japan Hadron Project, an spallation source which could be upgraded up to 5MW is expected.

In all continents one has thus reached the conviction that the future of neutron research is with spallation sources. Therefore world wide developments of spallation sources are pursued and for new "mega" sources everywhere spallation sources are proposed. Within the frame of OECD some agreements were achieved, in order to jointly carry out technical developments which are common to all sources. For example presently experiments on materials development for MW targets are performed at the AGS accelerator in Brookhaven with Japanese, American and European participation.

In Europe the project of a high intensity pulsed source can only be achieved on a European scale. Therefore, it was natural to start the ESS as a European source. In this way, the broad scientific and innovative potential of all the European countries comes together. Also the finances for such a project are beyond national budgets.

#### **IV. The German Role in the ESS-project**

As already discussed, the Rutherford Appleton Laboratory together with the Research Center in Juelich have born the idea of ESS and pushed forward the feasibility study as leading laboratories. Also in the present research and development phase, Germany will play an important role. The HMI as well as the Research Center Juelich have agreed to collaborate on all three development areas, namely the accelerator, the target station and the instrumentation.

In connection with the accelerator the development of pulsed superconducting accelerator structures are undertaken, in order to reduce the costs for the construction as well as for the operation of the LINAC. Also some work is devoted to the reduction of beam losses.

With respect to the target station, research on radiation damage, on structural materials, the structure mechanics under the impact of proton pulses and the thermal hydrolics of the targets are undertaken. Furthermore, nuclear investigations in order to optimize the target moderator reflector system are planned. Furthermore, concepts for the cold moderator are investigated.

Finally, in the frame of instrumentation of pulsed sources the investigation of broad band instruments is planned. Here one would like to develop software for virtual instruments, in order to simulate instrumentation at the computer. It is planned to build a test beam for the investigation of new instrumentation at the Rutherford Appleton Laboratory, to develop the spin echo spectroscopy at a pulsed source as well as to study multiplexing.

## V. Evaluation by the KFN

The KFN supports strongly all efforts to create a next generation neutron source in Europe in constructing the European Spallation Source. Knowing that the technological limits of the neutron flux which may be reached with high flux reactors is practically reached with the ILL, the concept of a high flux spallation source is the correct decision.

Pulsed neutron sources are able to produce peak fluxes, which are about two orders of magnitude or more above the average flux of the research reactor in Grenoble. Since neutron scattering experiments nearly always are limited by the intensity of the source, the progress in neutron intensity is of greatest importance in the development of new sources. With the ESS therefore a quality leap could be reached, which would surpass that from the medium flux reactors to the high flux reactors achieved in the 70<sup>th</sup> and which at that time created new qualities in research. The KFN states that with the ESS the decisive step towards the future of neutron scattering beyond the ILL is taken.

The KFN welcomes the early on European character of this project. During the phase of the feasibility study this European approach has been well achieved and the coming multinational cooperation in the second step, the research and development phase, is strongly welcomed. The KFN encourages the participants to bring as many as possible other European countries into the R+D phase.

The strong engagement of the *Forschungszentrum Jülich* and the HMI will strengthen the German participation in the project. The KFN welcomes these activities of the two research centers which will corroborate the German participation in the ESS project.

/1/ ESS-A Next Generation Neutron Source for Europe, Volume II  
The Scientific Case, (1997) ISBN 090 237 6500, 090 237 6608

/2/ Scientific Prospects for Neutron Scattering with Present and Future  
Sources, ESF Framework Studies into Large Research Facilities (1996)  
ISBN 2-903148-90-2

A meeting of the Budapest Neutron Centre users was held in Budapest, November 13, 1997 with the aim of information of the Hungarian neutron research community on the progress at the Budapest Research Reactor, international relations and events as well as on the plans and concept of the future European Spallation Source (Agenda attached). The ESS project was introduced by A. D. Taylor. As a result of the lectures given and followed by a lively discussion a statement on ESS can be given as below:

## Statement on the ESS

The Hungarian neutron scattering community strongly endorses the general concept of the ESS and urges its timely realisation early next century. To this end, it wishes to be fully involved in the forthcoming R&D phase.

There are opportunities for the Hungarian community to contribute in two prime areas, namely

- the development of novel neutron scattering instrumentation and techniques;
- the development of a realisable target system for ESS.

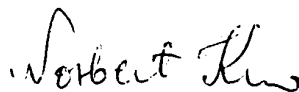
Examples of the specific areas of expertise what Hungarian scientists and engineers bring are

- dedicated access to neutron beams for test and development
- proven record in the realisation of new ideas
- familiarity with time of flight techniques
- experimental and theoretical capabilities in thermal hydraulic and neutronic design


The Budapest Neutron Centre with its developing and rapidly growing user community serves as a national and regional basis for integration to the European neutron research community and towards the future ESS.



Dr. E. Sváb



Prof. N. Kroó



Dr. L. Rosta

## **Societa' Italiana di Spettroscopia Neutronica**

*Il Presidente*

**Prof. Fabrizio Barocchi**  
**UNIVERSITA' DI FIRENZE**  
**Dipartimento di Fisica**

Largo E.Fermi 2, Firenze 50125, Italy  
phone: 39-55-2307-679, computer mail: Barocchi@FI.INFN.IT

The last meeting of the Italian Neutron Scattering Society (SISN-Societa' Italiana di Spettroscopia Neutronica) was held in Roma the 7-8-9 October 1997, at the meeting the first two volumes of the ESS Project were distributed among the various participants, which were a total number of 80 ( the number of SISN members is of the order of 120) During the general user assembly at this meeting, a discussion on the interest of the Italian neutron scattering user community on the ESS project was carried out after an introduction given by F.P.Ricci, the italian delegate in the last ESS Council, and by F.Barocchi, the italian member in the council for the Scientific case of the ESS. Several speakers contributed to the discussion and the following was stated and approved:

**"In the last ten years the Italian community has renewed its interest in the research carried out in various fields of science by means of neutron scattering. This started with the agreement between the Italian CNR and RAL for the use of ISIS and has been reinforced by the agreements between the Italian INFN, LLB and ILL for the use of the reactors in Saclay and Grenoble. The Italian community has always also agreed on the importance of the participation of Italian researchers to the design and construction of instrumentation for neutron scattering in such a way that a coherent increase of the expertise on neutron instrumentation is realized together with the increase of the user community. This lead to the possibility of financing the construction and upgrade of several instrument at ISIS, ILL and LLB with the contributions of the Italian funding agencies CNR and INFN.**

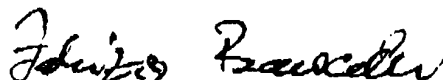
**The community is also aware that in the next decade, because of fast aging of present neutron sources, maintaining and renewing most of the European neutron sources will be an increasing need and moreover it will be mandatory to develop and realize new sources like ESS for maintaining to European research the world leadership in this strategic field.**

**The final definition and funding of the ESS project for the construction of a powerful neutron spallation source is the only chance Europe has at present in order to ensure a real future of neutron scattering in the starting decades of the next century.**

**The members of SISN therefore invite the President Prof. Fabrizio Barocchi to undertake actions in order to bring to the attention of the funding agencies the extremely important role of the ESS project and the necessity of the official participation of Italy to the future of the ESS project itself. In this contest the Italian community should coordinate the action of the various funding agencies involved and contribute to the development of new instrumentation for neutron scattering."**

*Il Presidente*

**Prof. Fabrizio Barocchi**



**NEDERLANDSE VERENIGING VOOR NEUTRONENVERSTROOIING**

European Neutron Scattering Association  
Att. Prof. A. Furrer, chairman  
Laboratory for Neutron Scattering  
ETH Zürich and Paul Scherrer Institute  
CH-5235 Villigen PSI  
Switzerland

Our ref.: NVNV129

Ref.: NVNV standpoint ESS

Delft, 5 December 1997

The Dutch Neutron Scattering Society (Nederlandse Vereniging voor Neutronenverstrooiing, NVNV) had its annual general assembly in May 1997. One of the topics was the neutron scattering facilities and expertise available for the Dutch users now and in the future. NVNV agreed upon the following standpoint.

For a healthy future of the neutron scattering research in the Netherlands it is necessary that :

1. the Netherlands has a home base with a good infrastructure, both concerning experimental facilities and scientific and technical expertise;
2. access to large international facilities is guaranteed;
3. a 'new generation' neutron source will be realised.

item 1:

At a 'home base' part of the research can be performed, where a high intensity or resolution is not necessary. It is also possible to do exploratory experiments, in order to use the large international facilities more efficiently. The home base is a concentration point of expertise in the field of neutron scattering. Furthermore, the smaller regional sources are very suited to train scientist and to develop new neutron techniques and methods. IRI, Delft, is at the moment the Dutch home base.

item 2:

For a part of the research where neutrons play a role, it is mandatory that use can be made of a top facility. Therefore it is of the utmost importance that the access to (at least one of) the most powerful neutron sources now available, i.e. ILL and ISIS, is guaranteed for the Dutch users.

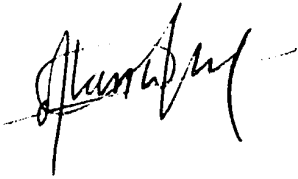
item 3:

For the longer term, it is important that a new-generation neutron source is developed. Three main arguments can be given: (i) A part of the present generation neutron sources will be shut down in the near future, whereas an increasing demand for neutrons is foreseen. (ii) For the progress of science, one should always strive for the best possible experimental facilities. (iii) The prospect of a neutron source that will be at least one order of magnitude more powerful than the presently available top facilities, will be very stimulating for young talented scientists. The combination of a new generation researchers and a new powerful source will result in a big leap forwards in neutron scattering research. This will lead to extra impulses in the broad range of scientific areas where neutrons yield unique information. *The* candidate for a new-generation neutron source is the ESS.

NVNV informed the Dutch Council for Scientific Research NWO, about the standpoint stated above, with copies to relevant bodies, e.g. Ministry of Science and Education, Dutch Physical Society, Dutch Chemical Society, Dutch members of the OECD Megascience Forum, Director of IRI, Director of ECN.

A study, co-ordinated by IRI, has started to define a Dutch contribution for the ESS R&D phase. In the beginning of 1998 a proposal, with contributions from the universities of Delft (IRI), Eindhoven and Groningen (KVI), is expected. NVNV strongly supports this initiative.

On behalf of the board of NVNV,



Dr A.A. van Well, chairman.

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**Norwegian Neutron Scatterers Statement about ESS**

Kjeller 02.12.97

At the moment and in the nearest future we are busy trying to improve our home base, that is the research reactor JEEP 2 and the neutron scattering instruments around it. To a large extent we have been supported by the Norwegian Research Council but also from the Institute. The reactor is more than 30 years old and needs running license for another 10 years from 1999. New instruments and methods have been introduced and old instruments have been modernized.

We are aware of the threatening neutron drought and support fully the technical solutions and scientific plans for the use of the European Spallation Source as have been shown in the 3 reports issued by the planning committees. However, the Norwegian economic support for ESS must be decided by the Research Council. On requests, the responsables in the Research Council Administration have admitted to have discussed the ESS plans, but had not decided yet whether they would support them economically. In general, for the time being, they did not want to engage Norway in another international project as they had a hard time funding research projects in Norway. There is even work going on to see if Norway should detract from CERN or ESA to get more money for national projects.

Dr. O. Steinsvoll

Norwegian Delegate to the ENSA Committee



**ESS Project:**

**A Statement by the Polish Neutron Scattering Society**

The Polish Neutron Scattering Society has expressed its favour of the source. This project is of special importance for young physicists from the Central and East Europe as it makes possible to carry out high level neutron scattering investigations.

Prof. Dr. A. Szytula,  
Chairman of the  
Polish Neutron Scattering Society

МИНИСТЕРСТВО НАУКИ И ТЕХНОЛОГИЙ РОССИЙСКОЙ ФЕДЕРАЦИИ

ГОСУДАРСТВЕННАЯ НАУЧНО-ТЕХНИЧЕСКАЯ ПРОГРАММА  
"АКТУАЛЬНЫЕ НАПРАВЛЕНИЯ В ФИЗИКЕ КОНДЕНСИРОВАННЫХ СРЕД"

НАУЧНЫЙ СОВЕТ  
ПО НАПРАВЛЕНИЮ "НЕЙТРОННЫЕ ИССЛЕДОВАНИЯ"

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На N \_\_\_\_\_

## ESS PROJECT RUSSIAN NATIONAL STATEMENT

The Statement is based on the results of the survey conducted by the Russian State Programme "Neutron Investigations of Condensed Matter."

The official representatives of the leading research institutes of Russia, as well as individual scientists working in the field of neutron scattering investigations or development of accelerators have been questioned and expressed their opinion of the ESS project. The survey covered the following organizations: Joint Institute for Nuclear Research (Dubna), St.Petersburg Nuclear Physics Institute (Gatchina), Kurchatov Institute (Moscow), Institute of Nuclear Research (Troitsk), Institute of Theoretical and Experimental Physics (Moscow), Institute of Metal Physics (Ekaterinburg), Institute of Physics and Power Engineering (Obninsk), and Institute of Experimental Physics (Arzamas-16).

The Directorates of the said institutions together with the members of the Russian scattering community are unanimous in their opinion of the necessity to support the ESS project. They consider ESS as an extremely timely project which must be realized. For Russian scatterers it is a very important project from the point of view of both opening new scientific horizons and providing a means for further integration of Russian scientists into European scientific community.

A list of the ESS topics that Russian institutes might actively participate in will be presented to the ENSA Meeting in Delft on 8-9 December, 1997.

 V.L.Aksenov

Chairman

Russian State Programme  
"Neutron Investigations of Condensed Matter"

 A.V.Belushkin  
Russian Representative for ENSA

**Spanish Statement concerning ESS**

Spanish participation at the ESS R&D phase:

After discussions between the different partners with interest in taking part in activities described in the ESS-3 document (feasibility study) the following actions have been taken:

- A consortium was formed between the CSIC and CIEMAT research establishments with two large engineering firms. The latter do have relevant experience in collaboration with several large scale experimental facilities (CERN, JET, RAL) and see participation in ESS as an important strategic option for the middle-term future.
- The Centre de Investigaciones Energeticas, Medioambientales y Tecnologicas (CIEMAT) has agreed to act as a co-ordination center. It has the power (and the will) to sign the MoU, once the main lines of activity of the Spanish partners are clarified from discussions with different groups in charge of the different items described in the ESS-3 document.
- A letter of intent explaining these particulars was sent by the CIEMAT director general to the last ESS Council meeting. Official acknowledgment of receipt as well as some indications on the ensuing actions to be taken are expected.

Prof. Dr. J. Colmenero,  
Spanish Delegate to the ENSA Committee



**Chalmers University of Technology  
Department of Applied Physics**

1997-12-07

To the European Neutron Scattering Association

Re: The ESS project

In response to the question by ENSA/ESF regarding the European neutron scattering user societies opinion about the European Spallation Source (ESS) project, the Swedish Neutron Scattering Society (SNSS) would like to express it's standpoint as follows.

The direct answer to the question is:

The Swedish neutron users are positive to ESS and think it is the best possible solution for a future high performance neutron source in Europe.

However, the users would like to add the following elucidation:

ESS is THE answer to the future demand of neutron scattering PROVIDED that it is supported by a network of smaller facilities. ESS on its own would be a waste of money. Simply upgrading existing sources and improving instrumentation is important, but cannot provide some of the technique/application breakthroughs that will be provided by ESS together with improved instrumentation.

On behalf of the Swedish Neutron Scattering Society,

A handwritten signature in black ink, appearing to read 'Lars Börjesson'.

Lars Börjesson

Chairman of SNSS

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**Swiss Society for Neutron Scattering**

**Memorandum concerning  
medium- and long-term strategies for the supply of neutrons  
and the project of the European Spallation Source (ESS)**

The Swiss neutron scattering community, formally organized in the Swiss Society for Neutron Scattering, has agreed at its annual meeting on November 21, 1997, at PSI Villigen, on the following statements:

**1. User community**

Neutron scattering has been used by a large number of Swiss groups as an important tool in condensed matter research for many years. The Swiss neutron user community is steadily increasing, and consequently the demand for neutrons continues. Therefore appropriate actions have to be taken in medium and long terms both on a national and on a European level.

**2. National level**

The existence of a home base for neutron scattering is considered to be essential. In Switzerland this is guaranteed by the spallation neutron source SINQ at PSI Villigen which is a medium-flux source expected to be operational far into the next millenium. SINQ has a state-of-the-art instrumentation which allows the performance of high-quality neutron scattering applications in both research and technology. Moreover, SINQ ensures the basic education and training of young scientists and students in the field of neutron scattering and constitutes a nucleus for the development of new instrumental techniques.

### **3. European level, medium-term strategies**

As neutron scattering is in many cases a flux-limited technique, the participation of Switzerland at European high-flux neutron sources is indispensable. Swiss user groups are increasingly engaged in experiments at the worldwide leading high-flux neutron sources HFR and ISIS located at the Institute Laue-Langevin (ILL), Grenoble, France, and at the Rutherford Appleton Laboratory (RAL), Didcot, UK, respectively. At present Switzerland is a scientific member of the ILL. The last years have seen a continuous development of instrumental techniques which offer a high potential for improving the efficiency of utilization of present neutron sources, in particular cases by more than an order of magnitude. This potential is not yet fully exhausted. In the medium term, efforts are needed to ensure the most effective use of present (high-flux) neutron sources.

### **4. European level, long-term strategies**

On the longer term, there is a clear need for an advanced European neutron source which will push the neutron scattering applications beyond their present limits. An advanced neutron source, exceeding the flux of the existing high-flux sources by one to two orders of magnitude, will both boost new scientific ideas and allow experiments with better resolution, on smaller and more complex systems, on shorter time scales, and with more sophisticated techniques (e.g. polarization analysis). Today the European Spallation Source (ESS) is the only project in Europe which fulfills these criteria. Switzerland has been very active in the feasibility study of the ESS project through the Paul Scherrer Institute (PSI), Villigen, which made essential contributions to the target concept and will be further involved in the target development.

**The Swiss neutron user community supports the ESS project and is willing to actively co-operate in defining an optimum concept and the technical specifications for the instrumentation as well as in the development of novel instrumental techniques.**

**UNIVERSITY OF ST ANDREWS****School of Physics and Astronomy**

North Haugh, St Andrews, Fife KY16 9SS

Scotland

*Professor R Cywinski BSc, PhD, C Phys, M Inst P, FRSA*

Director of the St Andrews Centre for Advanced Materials



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Professor Dr A Furrer  
Laboratorium für Neutronenstreuung  
ETH Zurich & Paul Scherrer Institut  
CH-5232 Villigen PSI  
Switzerland

30 December 1997

Dear Professor Furrer

I am pleased to inform you that the UK Neutron Scattering Community has formally declared its strongest support for the European Spallation Source Project.

The annual UK Neutron and Muon Beam Users' Meeting (NMBUM) was held in Oxfordshire, England in September 1997. The meeting was supported financially by the Engineering and Physical Sciences Research Council and co-organised with help from the ISIS facility, the Institut Laue Langevin and the Neutron scattering Group of the Institute of Physics and the Faraday Division of the Royal Society of Chemistry. At the meeting the participants (over 250) unanimously endorsed the European Spallation Source (ESS) Project and agreed the following statement:

**At the UK Neutron and Muon Beam Users' Meeting held in September 1997 the participants discussed the European Spallation Source Project following the presentation of the Scientific Case.**

**The project was received enthusiastically as a unique opportunity to keep European scientists at the forefront in a wide range of scientific disciplines**

**It was agreed that the European Spallation Source is the best next-generation neutron source for the UK User Community, and it is essential for the success of our future research that it is built as soon as possible.**

The UK neutron and muon beam community clearly believe that the ESS is vital to the future of neutron and muon science, not only in the UK but also in Europe as a whole.



Professor R Cywinski

*Committee Member of the Neutron Scattering Group of the IOP and RSC**UK delegate to and Vice-Chairman of the European Neutron Scattering Association*

### ***The European Neutron Scattering Association (ENSA)***

The European Neutron Scattering Association, ENSA, is an affiliation of national neutron scattering societies and committees which directly represent neutron beam users. The overriding purposes of ENSA are to provide a platform for discussion and a focus for action in neutron scattering and related topics in Europe.

ENSA was inaugurated in 1994 under the Chairmanship of Professor D Richter. The current national delegates to the ENSA committee are:

#### ***ENSA Executive Board***

<b>Professor Dr A Furrer</b>	Switzerland	<i>ENSA Chairman</i>
<b>Professor R Cywinski</b>	UK	<i>ENSA Vice-Chairman</i>
<b>Doctor B Lebech</b>	Denmark	<i>ENSA Secretary</i>

#### ***ENSA Committee***

<b>Professor Dr P Fratzl</b>	Austria	e-mail: fratzl@uniloben.ac.at
<b>Professor R Vacher</b>	France	e-mail: rene@ldv.univ-montp2.fr
<b>Professor Dr D Richter</b>	Germany	e-mail: d.richter@kfa-juelich.de
<b>Professor L Rosta</b>	Hungary	e-mail: rosta@power.szfi.kfki.hu
<b>Professor F Barocchi</b>	Italy	e-mail: barocchi@fi.infn.it
<b>Doctor A A Van Well</b>	Netherlands	e-mail: a.a.van.well@iri.tudelft.nl
<b>Doctor O Steinsvoll</b>	Norway	e-mail: olav@ife.no
<b>Professor Dr A Szytula</b>	Poland	e-mail: szytula@if.uj.edu.pl
<b>Dr A V Belushkin</b>	Russia	e-mail: belush@nf.jinr.ru
<b>Professor J Colmenero</b>	Spain	e-mail: wapcolej@sc.ehu.es
<b>Professor L Borjesson</b>	Sweden	e-mail: borje@fy.chalmers.se

In addition, invited observers to the ENSA committee include representatives nominated by :

**Affiliated national neutron scattering groups** (eg Belgium, Czech Republic, Portugal)

**The major European neutron scattering facilities**

**Projects for new European Sources**

**The European Science Foundation**

For further information on ENSA see <http://www.psi.ch/ensa> or contact:

<b>Professor Dr Albert Furrer</b>	<b>Professor Bob Cywinski</b>	<b>Dr Bente Lebech</b>
<i>ENSA Chairman</i>	<i>ENSA Vice-Chairman</i>	<i>ENSA Secretary</i>
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