

SUMMARY OF RECOMMENDATIONS

BASIC FACILITIES

Recommendation: Research and development should be concentrated on the most advanced and unique projects and installations, backed by strong scientific demands from the JINR Laboratories.

FNLP

Recommendation: Regular financing and continuous support of the JINR technical services should be provided to complete this project as close as possible to the announced date.

FLNP should present a report at the next meeting on the urgency of the project in terms of the scientific opportunities which will be lost through further delays.

FLNR

(i) DRIBS

Recommendations: The PAC approves the experimental programme presented for DRIBs Phase I (light radioactive ion beams).

A detailed research programme for Phase II should be presented as soon as possible. The PAC recommends high-priority support of all aspects of the DRIBs project.

(ii) SUPERHEAVY ELEMENTS

Recommendation: The PAC recommends strong support of the MASHA project which will allow direct mass determinations ($\Delta M/M \approx 0.1\%$) and more detailed studies of chemical and physical properties of superheavy elements.

Recommendation: Superheavy-element chemistry should be fully supported and carried out with high priority.

The Project has been developed at the FLNR and realized at the JINR.

Co-operation of the JINR Member States in the Project DRIBs

Russia
Czech Republic
Slovakia
Poland
Romania
Bulgaria

We would like to note the support of the JINR Directorate and PAC on nuclear physics at all stages of the Project realization.

Chemical Identification of Element 112

Nuclear reaction: $^{238}\text{U}(^{48}\text{Ca}, 3n)$
14.11-10.12.2001 / U-400 FLNR / Dubna

Beam:
 ^{48}Ca (262 MeV)
0.6 pμA

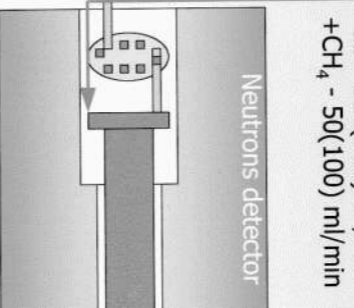
Target:
 U_3O_8 - 2mg/cm² +
 Nd_2O_3 - 50 μg/cm²
Backing 2 μm HAVAR
on Cu grid (80%)



Teflon capillary
30 m / 2 mm i.d.

He (pure)
250(500) ml/min

Ar - 250(500) ml/min
+CH₄ - 50(100) ml/min



Hg-like

Rn-like

DLNP

(i) PHASOTRON

Recommendation: The PAC awaits the results of the Phase 3 study and strongly recommends that the impact of significantly greater beam intensities, the resulting activations and induced radiation damage of beam components be included in the report.

The PAC also requires an oral presentation of the physics motivation for Phase 3 and of the potential benefits for the existing Phasotron experiments in order to make an informed judgement on this upgrade.

(ii) PROTON THERAPY

Recommendation: The PAC recommends the creation of an appropriate organizational structure for proton therapy demands from hospitals. Continued international collaboration is encouraged.

LIT

Recommendation: Permanent effort with adequate financing towards upgrading, modernizing (e.g. Gbit Ethernet Technology) and improving reliability and security features of the networking and computing infrastructure is necessary.

Recommendation: The PAC supports opening the new theme (“Information, Computer and Network Support of JINR Activities”) from 2003. Its organizational structure should permit an intimate liaison with scientific users of facilities provided by LIT.

COMMENTS ON THE SCIENTIFIC PROGRAMMES FOR 2003–2009

The PAC heard with interest the Scientific Programmes in the field of Nuclear Physics for the years 2003–2009 of the different laboratories. It makes no specific recommendations at this time since these will be presented again in a more complete form in November.

The PAC considers this to be an important exercise and hopes that for its November meeting the written reports will be received in time for them to be studied before the meeting.

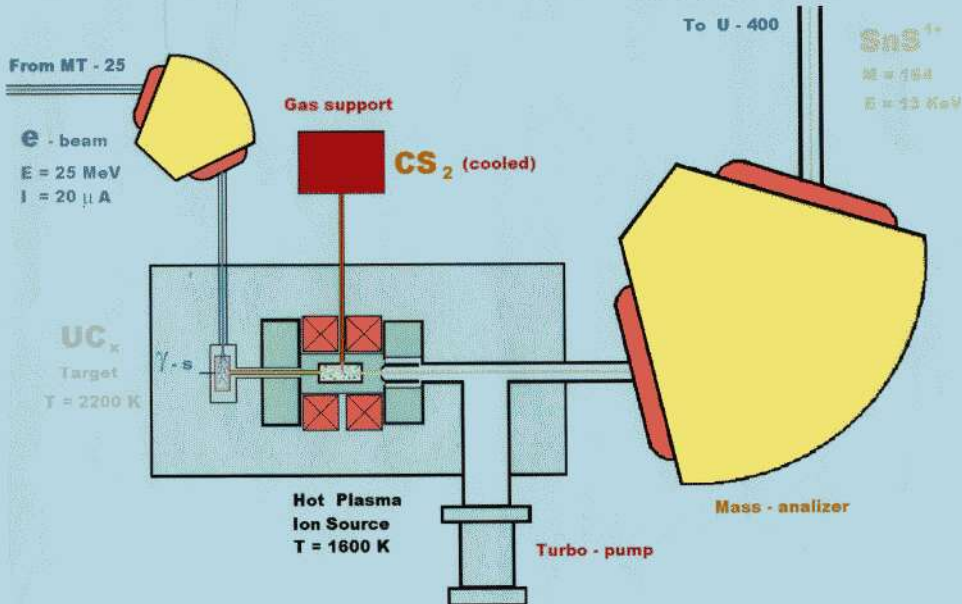
Concerning the physics programmes, the PAC members feel that their future recommendations must be made in terms of the major scientific goals of the various projects and that these need to be well defined and emphasised in all cases. For the LIT, the aims of this laboratory should similarly be defined in the context of the requirements of the community of physicists served by the relevant facilities.

FLNR

The newly completed DRIBS Phase I , the recently commenced DRIBS Phase II , the MASHA project and the programme of Superheavy Element Chemistry , as well as the established research programme on the dynamics of fusion/fission give an exceptionally strong foundation for an active and internationally competitive research programme for the whole of the period in question and beyond.

Experimental equipment for DRIBS II and the proposed experimental programme should, however, be further elaborated.

DRIBS-II productive complex



DLNP

This laboratory is involved in many interesting projects on *fundamental interactions in nuclei*. Since many form the basis of large international collaborations, it would be useful to know the extent of JINR participation in each of these. Also, where appropriate, the dates corresponding to completion of construction, data taking and data analysis within the period in question should be noted. Again a clear statement of the scientific goals and potential highlights of these projects will help the PAC to formulate its recommendations.

The *Phasotron* is currently a key element in the DLNP research programme. Since this is an expensive accelerator to run, it is especially important that the scientific importance of *Phasotron* experiments should be clearly elaborated.

The benefits to this programme of ongoing and planned upgrades should also be clearly given and the eventual exploitation of the *Phasotron* beam for the *SAD* project should be elaborated.

FLNP

Clearly IREN is an important future tool for neutron physics. However, at all its recent meetings, the PAC has learned of problems in the progress of this project. The PAC feels that the momentum for a successful completion of IREN should be re-established by the clear identification of an outside user community, and in terms of well defined scientific goals. Also, for the period in question, IREN should be put into the context of other international neutron facilities. The missed scientific opportunities caused by further delays should also be underlined.

Much has been heard in recent PAC meetings about the applications of neutron physics; for example REGATA and HEND (Mars Odyssey project), and the PAC greatly appreciates such work and looks forward to its continuation during the period 2003–2009.



SAD Basic Features

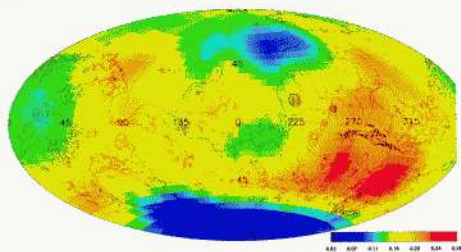
- **660 MeV, 3 μ A proton accelerator;**
- **Replaceable spallation targets (Pb, W, Pb-Bi);**
- **Air cooled subcritical MOX blanket with $k_{\text{eff}} = 0.94 - 0.95$, thermal power about 20 kWt;**
- **$\text{PuO}_2 + \text{UO}_2$ fuel pellets, ^{239}Pu content $> 95\%$;**
- **Pb reflector;**
- **Experimental channels with neutron flux density $< 10^{12}$ n/cm²s**

HEND: High Energy Neutron Detector

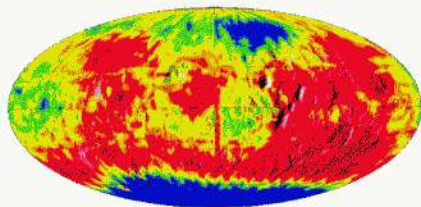
HEND has 4 signals of neutrons from sensors SD, MD, LD and SC/IN, and for each of them the map of orbital measurements is currently produced.

The map of MD sensor is contributed by epithermal neutrons mainly (top).

This MD map is consistent with the map for epithermal neutrons from Neutron Spectrometer (bottom)



Epithermal Neutrons, counts per sec



04/10/04 16:04:30

BLTP

The PAC appreciates the diversity of theoretical nuclear physics research at BLTP. A focusing on particular problems of interest to the experimental community is also welcomed. The PAC approves the general themes of research presented, but would again like to hear of the specific scientific goals of the laboratory for the period in question.

LIT

The recent evolution of the internal and external networks is welcomed. So is the greater liaison established with users groups. The continuation of these contacts is strongly encouraged.

Possible future technological advances in information technology may make the definition of a detailed programme for 2003–2009 difficult. General lines of development should be clearly defined while retaining a flexibility to respond to such technological advances.