Council for Science and Instrumentation (CSI) of the Laboratoire Léon Brillouin

Report November 2013

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Executive Summary

The committee was impressed by the motivation of the LLB staff, and their clear commitment to achieve the three fold mission of the facility – science, neutron instrumentation, and teaching – often with somewhat limited resources.

Over 20 years, LLB has developed into a highly integrated Center of Excellence that interconnects science and instrumentation across the French research community. LLB is the hub for neutron scattering in France connecting researchers, instrument developers, industry, and other scientific facilities in the region.

The scientific productivity of the LLB is excellent. The laboratory has historically maintained its high scientific profile by recruiting top level scientists who carry out cutting edge research programs while engaging and collaborating with researchers and users from external institutions. This staffing strategy has been very effective in creating, at LLB, a vibrant 'scientific life' which is key to the high international profile of the facility and a focus for continued development of the national neutron user community.

The instrumentation suite is complementary to that available at ILL, and provides an excellent capability for a very wide portfolio of research. New instrumentation under development is well suited to the developing science programs and role of the laboratory. The imaging instrument is coming into operation and will become a centerpiece for industrial collaboration.

The committee was concerned to hear that research staff levels are projected to fall by 25% over the next 2 years. The overarching conclusion of the committee is that this level of attrition would not only render the development of new neutron instrumentation practically impossible, but seriously compromise the scientific productivity of the laboratory, and the French neutron science community as a whole. It is essential, for the laboratory to maintain its ability to carry out the multiple roles effectively, that LLB management be enabled to manage, and plan, the appropriate staffing mix over a reasonably long period of time.

We are concerned with the impact that the proposed shutdown of the Orphée reactor in 2020 will have on the French neutron scattering community. We are convinced that, in order to maintain the scientific excellence that has been achieved in a wide range of fields supported by neutron scattering, it is critical to maintain a fully supported national facility such as LLB. The foreseen 2020 shutdown is likely premature in that it will not only lead to a difficulty in hiring new staff, but will seriously impact the access to neutrons for the French research community for a significant period of time.

Hence we recommend:

1. Maintain full operation of the Orphée reactor until 2025 at least. Publishing this commitment will help maintain the science excellence and knowledge base that France has developed in this field over the last 20 years

2. Take the time to assess the European landscape and develop a sustainable plan for the French contribution to this landscape.

We re-iterate our very favorable impression of the scientific productivity of the facility; this could not be achieved without the commitment and professionalism that we witnessed amongst the staff.

Introduction

The CSI was asked by the Conseil d'administration du Laboratoire Léon Brillouin to assess, in their 2013 report, the science programs at LLB, with particular emphasis on the relevance of the science programs on the instruments under development and the scientific collaborations in which LLB participates.

Given the specific focus on the science programs and the three scientific axes along which LLB aligns research activities, (Magnetism and Superconductivity; Materials and Nanosciences; Soft Complex Matter) two additional committee members were asked to participate in the assessment: Olivier Diat, Institut de Chimie Séparative de Marcoule; and Alan Tennant, Institute Complex Magnetic Materials, Helmholtz Zentrum , Berlin. The committee members for 2013 are listed in Appendix 1.

The background information that allowed the committee to develop their report was gathered in two ways:

1. Offline documentation (annual reports, research directions, publications, etc.) were provided on an external web site.

2. The committee spent two days at LLB (October 17-18) talking with staff and users. The program for the on-site visit is provided in Appendix 2. Science highlights were presented by LLB research staff, Ph.D students, and external users. **All were impressive**. Unfortunately, Ian Anderson was unable to participate in the on-site visit.

The members of the CSI would like to thank all LLB staff for hosting them during their visit to the facility on the 17th and 18th of October. We appreciated the open conversations with the members of staff that we met.

This report has been compiled and approved by all committee members and verified for factual accuracy by LLB management.

General Comments

Science productivity and quality

The scientific productivity is excellent. The laboratory has historically maintained its high scientific profile by recruiting top level scientists who carry out cutting edge research programs while engaging and collaborating with researchers and users from external institutions. This staffing strategy has been very effective in creating, at LLB, a vibrant 'scientific life' which is key to the high international profile of the facility and a focus for continued development of the national neutron user community.

It is also important to note that because LLB scientific staff is engaged in leading research programs, the instruments are also kept at the cutting edge of their science capabilities: "no-one ever washes a rental car!"

The science research programs at the laboratory are coordinated along three axes: Magnetism and Superconductivity; Materials and Nanosciences; and Soft Complex Matter. This mechanism allows researchers (permanent and visitors alike) to find a 'scientific home' at the laboratory although there is considerable overlap and interaction between these axes. Specific comments on each of these axes are provided in the following sections. Overall, however the standard science 'metrics' of the laboratory are impressive:

- 959 publications (Web of Science) since 2008
- Average impact factor 4.1
- Fourth most productive neutron facility in the world following ILL, ISIS, and NCNR/NIST.
- LLB, either through experiments or collaborative research programs, is involved in 65% of publications from the French neutron scattering community
- An average of 400 experiments per year

Staffing

In our 2012 report we commented on the low level of staffing at the laboratory, particularly given the multiple roles the laboratory fulfills historically (research, access, and training), and the additional mandate of developing large scale instrument development projects in support of France's contribution to ESS. In particular, in order to meet the new mandate, we suggested that: *"Given the demographics of the present research staff at LLB there is a near term opportunity to manage the mix of staff over the coming years"*. There was a tacit assumption in this statement that staffing levels would, at a minimum, remain constant. The committee was concerned to hear that research staff levels are projected to fall by 25% over the next 2 years. The overarching conclusion of the committee is that this level of attrition would not only render the development of new neutron instrumentation practically impossible, but seriously compromise the scientific productivity of the laboratory, and the French neutron science community as a whole.

Role of LLB in the International and National Context

As a national source LLB plays a critical role in preserving and developing the French know-how in neutron based research. This includes training new users, providing critical access to neutrons for established users, and developing a cohort of French researchers and engineers who know how to build and develop instrumentation. This cannot be done at a major International facility. It is the LLB, and not ILL, that provides the hub of scientific activity for French neutron users. As such it is natural that LLB take on the leading role for coordinating and hosting the science and instrumentation activities of the French community at the future ESS. Additional staff, with a demonstrated expertise in instrument development and project management is required to do this. Furthermore, large scale instrument projects in support of the ESS will require long range planning of, and commitment to, resources (budget and manpower). **Hence it is critical that LLB management be enabled to manage and plan the appropriate staffing mix over a reasonably long period of time.** This is essential for the laboratory to maintain its ability to carry out the multiple roles effectively. Presently, not only does LLB management have virtually no control over staff replacement, projected staffing quotas indicate a sharp decline. We reiterate our previous recommendation that a staffing model similar to that used for Soleil is the only sensible way for the laboratory to put into place effective long term staffing plans.

Future

These concerns are of course exacerbated by the forecast shutdown of the Orphée reactor in 2020. It will become increasingly difficult to attract young scientists and engineers into the laboratory when the very tool that they rely on to carry out their work has a limited life. Even if the long term perspective for neutron beam access for French researchers includes the ESS, the reality is that ESS will not reach full science productivity until at least 10 years after operations start, i.e. 2030 or later. The direct impact of this long term scenario is of course a reduction of beam time access for French researchers in the 2020 time frame by approximately 60%! However, the secondary impacts will play out in the long term and are extremely worrisome. A lesson can be learned here from the experience in the US with the construction and operation of the SNS. Prior to the debut of SNS construction project, the US had undergone a significant period of time without a facility that could be considered as the 'home base' for a significant neutron scattering program. **The effective result was a missing generation of researchers who really knew how to design, build and use world class neutron instrumentation**. During construction, SNS found it hard to recruit US nationals who had experience in building instrumentation; during operation there was a significant incubation time for science productivity while users had to be effectively trained. Within the present scenario, France could relive that experience to the severe detriment of the neutron enabled research programs. Without a national facility, where instrument developers, researchers and users alike can find a home, on a somewhat permanent basis, the French neutron user community will collapse. This is a precarious situation with no easy way forward – the committee is fully aware of the enormous funding constraints confronting research budgets. We do however offer the following comments:

- It is imperative to maintain a home for the French scattering community even in the future when ESS is being counted on to provide significant access for French researchers.

- Presently LLB fulfills this role admirably! Over 20 years LLB has developed into a highly integrated Center of Excellence that interconnects science and instrumentation across the French research community. In our experience we see no better example; nor do we see, in the present scenario, a way of replacing this asset.

- Operation of the Orphée reactor is a very cost effective means of supporting this Center of Excellence. Again, we see no mechanism for replacing this function in the short term.

- In order to maintain the scientific excellence of the French neutron scattering program, with LLB as its hub, it is crucial to commit to a long term strategy which will maintain the engagement of the community.

Hence we recommend:

1. Maintain full operation of the Orphée reactor until 2025 at least. Publishing this commitment will help maintain the science excellence and knowledge base that France has developed in this field over the last 20 years.

2. Take the time to assess the European landscape and develop a sustainable plan for the French contribution to this landscape.

Given our firm conviction that a home based neutron source is a critical component of any national neutron scattering research strategy, the long range planning should include the eventual replacement of the Orphée reactor. Given the significant accelerator knowledge base in France, it is not without reason to conceive of a project to build a small scale accelerator based neutron source. Not only have such facilities shown themselves to be highly productive for a range of applications, in addition to neutron scattering, but they have proved to be essential development tools for the training of researchers and development of techniques in preparation for application at larger facilities. Japan is an excellent example of this where the Hokkaido University Neutron Source was (and still is) crucial for the development of the MW spallation source at JPARC.

Science

The science program at LLB is carried out over a suite of 19 instruments which are available in user access mode, 2 additional instruments that are used for test purposes, and 4 instruments are under construction. The effectiveness of the neutron beam time can be judged by the fact that on the average a publication results from 2 experiments. This is the norm for all world class, fully operating, neutron facilities.

The research output is clearly a combination of user promoted research and internally driven programs; the fact that there is not always a clear distinction is a good sign of the high level of collaboration and esteem of the LLB research staff. Research staff members in all disciplines have been very proactive in seeking funding opportunities and developing international collaborations – these contracts fund a significant part of the research program and some instrument development. There is however a sense of frustration among staff that their affiliation with a large scale facility is often taken as a sign that they do not require additional funding and their proposals end up providing funding to others. This perception is very unfortunate and is potentially preventing top notch researchers from obtaining funds for their programs. We gather this frustration is shared by other researchers across the plateau.

In a similar fashion, it is often perceived that neutron scattering techniques are more applicable to ‘fundamental’ research and hence not necessarily relevant in an applied field. Given an environment in which it is often necessary to emphasize the direct applications, we recommend that LLB consider developing a communication strategy that highlights the applications enabled by their research programs.

Axe 1: Magnetism and Superconductivity

The program on Magnetism and Superconductivity at LLB is focused and effective. It covers a broad range of topics including high temperature superconductivity, frustrated magnetism, and molecular magnetism, delivers first class science and is well matched to the needs and capabilities of a national facility. The research is very visible internationally, as witnessed by the impressive publication metrics (230 publications in the last 5 years, an average impact factor of 4.6, including 8 publications in Nature, Science, and Nature Physics), with the superconductivity research in particular at the highest level.

The activities are well integrated and overall provide essential new knowledge in a vibrant research area. The experimental capabilities at the research reactor are used to great effect and the polarized and triple axis neutron capabilities in particular will keep the research competitive for years to come. However, crucial to the success is the quality and motivation of the scientific staff which is threatened by losses to other institutes and retirements. We strongly recommend that management makes every effort to maintain the level of excellence in the program by providing the postdocs and new hires necessary to keep the LLB a leading center.

Our assessment is based on the comprehensive picture of the program presented in the extensive written documentation, talks, and discussions provided. The program itself engages about one third of the research resources at LLB and has a strong fundamental research focus. This is appropriate and in line with other leading neutron centers. It overlaps with axis 2 where there is co-location of spintronics and molecular magnets that also have a more applications based content. The activities are grouped into focused research topics including superconductivity, geometrically frustrated systems, heavy fermion and 4f systems, and multiferroics. These are addressed by small teams of scientists, who, evidenced by the large number of high impact papers and invited talks, are achieving a high level of success. A notable factor here is the existence of long term and high level collaborations with nationally and internationally leading groups who bring in samples, people, and problems. The combined success is leveraged by the effective instrumentation and comprehensive range of expertise found at such a national center. The close proximity of the SOLEIL facility enriches this further. While it is clear that the science is of outstanding quality and highly relevant, the recent losses of younger staff scientists to other institutes causes considerable concern as there is no plan for their replacement and the erosion of the program is a real and pressing threat.

The work undertaken is highly relevant to national scientific needs. Without the results from neutron experiments the basic understanding of the materials to be adopted into devices is compromised. Further, an understanding of emergent electronic and magnetic properties in highly correlated systems is essential if these are to be mastered and their promise for energy materials and future information technologies fulfilled.

Despite the serious challenges facing it, the LLB is quite able to continue with this highly successful activity by taking action on a small number of points.

First, addressing the number of PhD students, postdocs, and their employment times is a priority as this would bring vitality to the program and train future researchers too.

Second, whilst the experimental capabilities, with polarization and TAS in particular, can keep the research activities at the highest level this cannot be achieved without at the very minimum one new staff hiring - although two is strongly recommended – to make good the recent losses of personnel. The new personnel should have a background in quantum and correlated magnetism with strong theory and/or synchrotron x-ray backgrounds to couple best with the advantages currently on offer. Of particular concern is replacement of staff operating the G4.1 powder diffractomer, which is a highly productive instrument for the determination of magnetic structures.

Third, the close coupling of theory with experiment can significantly enhance the science impact and so we recommend that stronger collaborations should be established in the lines of highly frustrated and molecular magnets. Obvious choices for these interactions would be through the ENS Lyon, or Insitut Néel (Grenoble) and LPTMC, University Paris6, IPHT (CEA, Gif-sur-Yvette) in Paris. Bringing in esteemed visitors for extended stays would be an effective approach.

Fourth, a longer term outlook for neutron sciences can be constructed given the options available which can provide highly attractive careers for scientists of the highest caliber. It must be a priority of the management to clarify how this is done. Finally, the LLB has outstanding staff members and by providing a stimulating and creative scientific environment there is no reason that it cannot keep its most important assets.

In summary, the Magnetism and Superconductivity program shows in an exemplary way how small scale integrated activities can be of very high impact. The activities are well structured and the right sets of problems are being worked on. Critical and pressing challenges are present, however we judge that these can realistically be addressed if a small number of actions are taken and in return promising a rewarding and high impact program for the future.

Axe 2: Materials and Nanosciences

The Materials and Nanosciences axis deals with composite materials, confined systems, magnetic structures, metallurgy, crystalline-guest, and disordered systems. This axis is characterized by the need for a multiscale approach (from 0.1 to 100 nm) and hence requires the use of the majority of the LLB spectrometers (neutron diffraction, reflectivity, SANS, texture and strain measurements, imaging…). The subjects are of high scientific relevance and have many potential applications. The high level scientific production with almost 200 articles over the 5-year period clearly shows that the LLB researchers are very active in the field and benefit from fruitful collaborations. The average impact factor (3.34) for publications is good and only slightly smaller than for the other axes as expected for a materials oriented research program. A large number of research projects have successfully received funding from various agencies (local, French and European) and in collaboration with industry. This is a clear demonstration that the team is doing highly relevant science, obtaining very interesting results and is able to manage external projects efficiently.

It has to be noted that part of the activity of this axis overlaps the two other axis on magnetic structures, nanocomposites and confined systems, and there is excellent collaboration between the groups.

In addition to a general scientific overview of the research themes in this axis, three highlights on nanoporous materials, molecular magnets and oxide glasses were presented by a permanent researcher, a PhD student and a collaborator from the Pierre et Marie Curie University (Paris VI), to illustrate the different activities of the team. Committee members were impressed by the quality of the presentations and of the presented results. We were also pleased to note that these presentations were not just repetitions of work presented in the written documentation but were complementary and highly representative of on-going research by staff and users.

The axis is sub-divided in three main themes:

1) Nano/heterosystems: the main topics are composite systems (typically polymer reinforced by nanoparticules), magnetic nanostructures, thin film and molecular, organized guest-hosts systems, and microporous materials

2) Metallurgy with composite materials controlling the precipitation of nanoscale reinforcements, shape memory alloys and the study of the mechanical properties and ageing.

3) Disordered and confined systems, including research on liquids and glasses.

Most of the presented results (oral presentation and report) were judged of very high quality and novelty. The committee members were particularly impressed by the work (in common with the axis 1 magnetism and superconductivity) on molecular magnets; polymers reinforced by magnetic nanoparticles; and the work on magnetic thin films for spintronic applications. The refurbishment of the diffractometers such as 7C2 is highly relevant to the work in this field, and will undoubtedly lead to a plethora of high quality results in the future.

The committee members noted a lack of effort (capability) on the modelling approach in support of the experimental program. We understand that hiring theoreticians, specializing in multiscale simulations (especially taking into account the large variety of complex materials studied in the axis) cannot be a first priority; given the projected decrease in staffing highlighted above, there is an urgent need to prioritize new hires for spectrometer operation in the coming years. However we believe that the research in this axis would benefit significantly from stronger collaborations with experts in modelling and so we recommend that LLB researchers actively develop external collaborations with groups specialized in modelling.

It is clear also that the main threat to the scientific productivity of this group is the projected decrease in the number of permanent researchers over the next years. This is compounded by the fact that, given the focus of this axis on materials research with robust industrial relevance, it is also crucial that they continue developing bilateral collaboration with industry. The new imaging instrument will be a key capability for industrial partners and, as we highlighted in our previous report, it is imperative that it goes forward rapidly. However, once again, it is not clear to us how it will be effectively staffed given the staffing constraints. One option would be to engage thesis students or early career researchers directly funded by industrial partners.

Axe 3: Soft Complex Matter

The science in this axis covers both Soft Matter and Biology as a common theme with the aim of understanding the behavior of the individual building blocks (molecules, nanoparticles, polymers, surfactants, and phospholipids) whose characteristic sizes are in the 0.1 to 10 nm range; and the underlying mechanisms of their self-assembly and dynamics, in order to control the properties and function of soft and biological assemblies at the nanometer scale (1 – 100nm). The range of specific topical areas includes: polymers, foams, emulsions and asphaltenes, confined systems, membranes, local dynamics in water and protein, and crowding in biophysical systems.

The committee was provided with a superb scientific overview covering a large range of soft-matter subjects with examples related to challenging issues: studies for a better control of the self-assembly of 2D- or 3D-structures with either a dedicated response to external stimuli (smart materials, foams ..) using (multi)functional block entities; mastered vectorization of various species (like drugs or nutriments, ions or nanoparticles); and investigations of biological-based systems (membranes, crowding in complex media). Through these examples the team really showed the specific advantages of using thermal neutron scattering techniques in this field: non-invasive, no radiation damage; the ability to effectively contrast organic structures, especially when associated to inorganic systems (multi-functional soft/hard hybrid materials); and the capability of providing specific contrast by systematic deuteration.

Some highly relevant research themes of this focus area include:

- asphaltene aggregation - relationship between multi-scaled structure and the rheology of heavy crude oil and asphaltene adsorption on the solid surface (the highly relevant 'plug problem')
- Peptide aggregation in lipidic bilayer systems forming ion channels – conductance data analysis in terms of bilayer curvature energy
- Nanocomposite (silica nanoparticle in polystyrene matrices) – mechanical reinforcements (or other macroscopic properties) – dynamics at short scale (nanoseconds range) using time of flight techniques.

The various presentations highlighted the very high competence of the teams:

- for instrumentation development with new and accepted projects (spectrometers, PA20, FA#, Imaging, etc.) underway,
- for training in neutron science (a majority of the PhD students or post-docs are still using "neutron" for their own research – even in industry, ex. J. Gümmel),
- for selecting hot topics and providing answers to societal issues .

The average number of publications per year (about 45) with an average impact factor of 4 is more than acceptable taking into consideration the time spent on the spectrometer for helping users.

The list of collaborations with a wide range of national and international labs is rather long with an impressively large number of scientific contracts (academic and national (ANR, RTRA, C'nano….) as well as industrial (OSEO, PhD grants, etc.).

Through these examples, the teams have demonstrated that they have found a good balance between fundamental (or basic) research and applied research, taking into account the complexity of the real systems and being able to build the suitable model (e.g. dynamics of protein in crowded environment).

Although this field is also being impacted by the departure of some of the senior researchers, the committee was very impressed by the caliber of recent, less established, recruits; excellent researchers with viable long term research directions and projects in mind. In the short term then, this research axis is well represented by high caliber research staff who carry out admirably the multiple missions of the facility; however, they are faced with carrying out this mission with fewer people and less support in the future. We are concerned that they are already at the limit in terms of staffing and this could be risky for the excellence and the quality of the research work in the future if they lose their motivation due to the pressure.

Keeping these constraints in mind the committee offers the following recommendations:

1. The research themes being followed are relevant and well chosen; however, given that it is becoming more incumbent on research community to justify the relevance of basic research, we would recommend a more aggressive communication or marketing strategy.

2. Develop collaborations that strengthen the coupling of NMR capability with the neutron scattering program. The arrival of P. Judeinstein, expert in NMR, and the collaboration, with local CEA support, with D. Sakellariou, expert in high resolution and high sensitivity NMR (micro) imaging, will go a long way to enabling this coupling.

3. Develop programs in food science (INRA collaboration) – the capability to couple imaging and scattering is of particular interest in this field.

4. Grow collaboration with industries such as IFP, Essilor, P&G, and other biotech companies doing research in drug delivery

External Collaborations

The Laboratoire Léon Brillouin (LLB) is the French National Facility for neutron science, and as such performs 60% of the French neutron scattering activity. This is particularly obvious with the numerous links with French Universities (Paris 6,7,11, 12, 13, Aix Marseille, Bordeaux, Clermond Ferrand , Lyon, Montpellier , Nantes, Orléans, Pau, Rennes, Strasbourg, Toulouse), engineering schools (Agrosup Dijon, ESPCI Paris, ENSTA, Palaiseau), CNRS Institutes (INéel Institute Grenoble, CERMAV Grenoble, ICS Strasbourg, Crismat-Caen), CEA laboratories (CEA IRAMIS Saclay, CEA/DSM/INAC Grenoble, CEA

Cadarache, CEA/DRT LITEN, CEA/DEN) and other public French institutes including INRA Nantes (agronomy), IFP (oil), Institut Curie (medicine and biology).

Several industrial collaborations have also been established, taking benefit from PhD students entering industrial careers and continuing the collaboration with the LLB. The most notable interactions are in the fields of polymers (Michelin), the food industry, and metallurgy (stress imaging).

Collaborations with the nearby synchrotron source, Soleil (other national facility) are also taking place, principally through the implementation of a common PhD program.

Overall, the balance between collaborations for basic science, R&D and industrial projects is excellent and benefits from the overlap between the three principal axes of research.

The LLB has a remarkable international visibility:

With other neutron facilities:

Collaborations with most of the other national neutron sources in EU and outside EU are well established (Jülich and Munich in Germany, PSI in Switzerland, ISIS in the UK, JAEA Tokai Japan, NRC Kurchatov Institute in Russia). Experiments performed at the LLB are very often part of a broader research program involving other European large scale facilities, either in their complementarity (e.g. x-rays at for example ESRF), or as preliminary experiments in preparation for work to be performed at ILL.

Last, but not least, the LLB has the key role and responsibility of being the entry point for the instrumentation proposals of the French neutron community concerning the future European Spallation Source.

With numerous research institutions:

This attractive and dynamic character of the LLB is clearly visible through the numerous collaborations with Universities or other Research Centers outside France, across all continents. The most numerous collaborations are with Germany, the US, and Japan; however, the list of collaborators from other countries is impressively long.

With industry:

The dynamism of the LLB researchers is also quite evident from their success in funding research programs through numerous contracts:

- **9 Industrial Contracts (**INRA, Michelin, stress measurements, component irradiations, test of neutron spectroscopy components),
- **4 Industrial ANR (**Metallurgy, membranes and composite),
- **15 ANR, 21 grants projects funded by the Région Ile de France**, including 5 from **C'Nano**.
- **2 ANR International Programs** (hydrogen bonding in liquids, discotic liquid crystal),

- **National collaboration and transverse program (** with the Region Aquitaine and the CEA),
- **EU Program FP7** mainly within the NIM3 (NIM3 (Integrated Infrastructure Initiative for Neutron Scattering and Muon Spectroscopy in the 7th Framework Program of the UE).

Taking into account the limited number of permanent staff at the LLB, their local contact duties, etc., this is a remarkable score!

Recommendations

The present level of collaborations is excellent. An opportunity exists for new collaborators from China and Taiwan, as these countries develop their neutron scattering capabilities, and are in desperate need of expert collaboration. However, the most pressing need will come from the home arena. Given the foreseeable 'neutron landscape' within Europe, in which the French research community will see a significant reduction in availability of neutron beam time (see the discussion above), a long term strategy should be developed which includes a stronger collaboration between the LLB and the ILL to ensure a consistent and reliable level of access for French researchers to neutrons beams. The LLB provides a vibrant home for the French neutron community, through access, training and instrument development, as well as expertise in key research programs.

Appendix 1 Committee Members

Claude Berthier	CNRS (Retired)	Claude.berthier@incmi.cnrs.fr
Gérard Gebel	UMR-5819 CEA-CNRS-UJF	Gerald.gebel@cea.fr
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Appendix 2 Program for the Council for Science and Instrumentation of the Laboratoire Léon Brillouin

Program for the Council for Science and Instrumentation Of the Laboratoire Léon Brillouin

Saclay the 17-18 october 2013

October 16th

19.30-22h Meeting in the lobby of Hotel le Guichet
Dinner of the council with the direction of the LLB
I Anderson, C. Berthier, G Gébel, A.Tennant, O.Diat + CAS, JPV, AM

October 17th

8.30-9.00 Transport to LLB
Location: bât 563 salle JRM
9.00-9.30 Introduction *: discussion with the LLB directorate + coffee*
9.30- 12.30 Meeting with Scientific Axis 3 (1:30 of presentation +1:30 of discussion)
Bâtiment 563 *salle 15, (all members researchers, engineers and technicians)*

SOFT COMPLEX MATTER

- *general presentation , Jean-Marc Zanotti, Fabrice Cousin* 15'
- *Membranes Giulia Fadda* 25'
- *Nanocomposites , Nicolas Genevaz (PhD student)* 20'
- *Ionic liquids Patrick Judeinstein (new LLB member)* 25'

12.30-13:30 Lunch (plateau repas, *salle 16*)
13.30-16.30 Meeting with Scientific Axis 2

MATERIALS AND NANOSCIENCES : FUNDAMENTAL STUDIES AND APPLICATIONS

- *general presentation , Frédéric Ott , Marie-Hélène Mathon* 15'
- *Nanomatériaux Florence Porcher* 25'
- *Contributions of neutron scattering in the field of molecular magnetism Karl Ridier (PhD student)* 20'
- *La diffusion des neutrons à haute température : évolution structurale dans les verres et liquides d'oxydes, Laurent Cormier (User)* 25'

16.30-17.00 Coffee
17.00-19.00 Time for reflection (only evaluators)
19.30-21.00 Dinner of the committee alone

October 18th

8.30-9.00 Transport to LLB, *salle JRM*
9.00-9.30 Reflections from day 1, free questions – coffee
9.30-12.30 Meeting with Scientific Axis 1 (1:30 of presentation +1:30 of discussion)

MAGNETISM & SUPERCONDUCTIVITY

- *general presentation Yvan Sidis, Isabelle Mirebeau* 15'
- *New states of matter in pyrochlores magnets Sylvain Petit* 25'
- *Chiral magnte under pressure, Maxime Deutsch (post doc)* 20'
- *Supra HTC, Markus Braden (User)* 25'

13.00-14.00 Lunch buffet with all LLB personnel
14.00-16.00 Additional discussion and feedback to the directors
Transport to station or airport