

# EXPERIMENTAL PROGRAMME AND USER ACTIVITIES

## 1. SUMMARY OF THE USER ACTIVITIES IN 1999 AND 2000

### 1.1 Operation of Orphée reactor and LLB facility

The reactor Orphée operated 215 days in 1999 and 208 days in 2000.

4196 and 3953 experiment days were realized respectively in 1999 and in 2000 on the 25 scheduled instruments. These values do not take into account the beam time given to the CRG teams on the following instruments : 2T (Kf Karlsruhe), G4.2 (PNPI, Gatchina), G4.3 (University of Wien) and G5.2 (INFM, Italy). The CRG time is usually 1/3 of the Orphée operating time (25% for G5.2). They include the full beam time for G4.4 (managed by ONERA) and 5C2 (managed by University of Aachen).

In spring 1999, in order to increase the beam size and the intensity on the thermal triple-axis spectrometer 2T1, and to install a polarized neutron option, the 2T beam tube before the monochromator and the collimators was completely replaced (see "highlight") during a 2 months shut-down of the reactor.

Within a period of 6 months in winter 1999-2000 and spring 2000, several (5) cold neutron guide tube elements (1.25 m long each), close to the reactor, broke, probably because of various ageing effects. This led us to put in place in 2000 and 2001 a systematic replacement programme of the oldest elements (installed between 1981 and 1985).

### 1.2. Instruments

The list and main characteristics of LLB instruments and a layout of their implantation are given in the introducing chapter "Presentation of LLB".

In Table 1 are summarized the numbers of realized experiments and scheduled beam days, on the different instruments.

The reflectometer DESIR was closed in 2000, the corresponding beam port (G5bis) being used to build a very-small angle diffractometer (see section "Technical and Instrumental Developments"). The reflectivity experiments on soft matter and liquids are now all performed on the more recent and higher flux time-of-flight reflectometer EROS, installed on the cold neutron guide G3bis.

The new instruments MUSES (Neutron Resonant Spin-Echo, built and managed in collaboration with the Technical University of Munich) and PAPOL (Small-Angle Neutron Scattering with polarized neutrons and nuclear dynamic polarization) have been partially (50%) opened to external users in 2000 (autumn 1999 selection panel).

### 1.3. User statistics

Table 2 indicates the distribution of beam time per country (based on the location of the laboratory of the main applicant), for experiments realized in 1999 and 2000.

Around 70% of the total beam time was used by French users in 1999 and 2000, which is similar to the previous years. 30% of the total beam time was used by foreign users; this number includes 18% for European Union, 4% for CEI (Russia and Ukraina) and 5% for PECO (Eastern and Central Europe) countries.

The distribution of total beam time per scientific domain (Round Table Sessions) was the following :

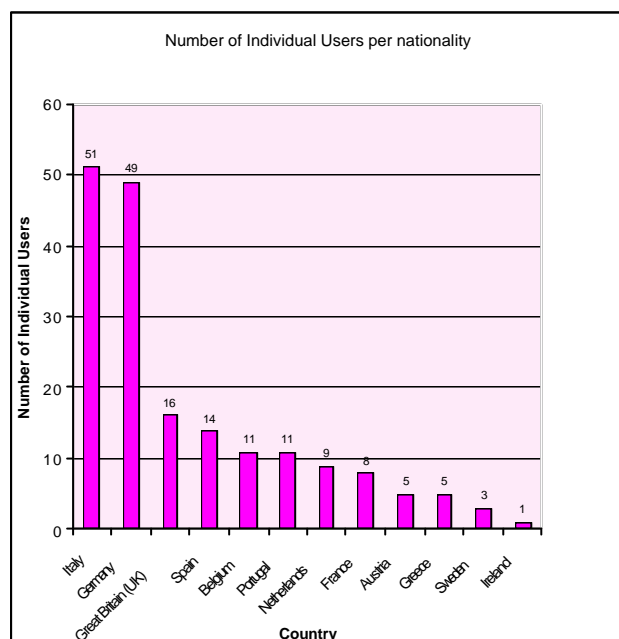
- 24% for Physical Chemistry and Biology (session A),
- 19% for Structural Studies and Phase Transitions (session B),
- 31% for Magnetism and Superconductivity (session C),
- 26% for Disordered Systems and Materials (session D).

### 1.4. European Access Programme

Since 1993, the LLB is a large scale facility for the transnational access of european users, in the frame of the Human Capital and Mobility (HCM, 1993-97) and Training and Mobility of Researchers (TMR, 1996-2000) Research and Development programmes of the European Commission. Among the E.U. users of LLB, those involved in the TMR access programme received 342 beam days in 1999 and 298 in 2000 (8.2% and 7.5% of the total beam time respectively).

# Experimental Programme and User Activities

The LLB TMR access programme finished in november 2000. During the 51 months of the programme, it allowed to perform 182 experiments (1409 experiment days) and to receive 183 individual users (issued from 12 different countries), among which 115 were new users of LLB. Their distribution per nationality is given in the following figure.



TMR  
« Access to LLB » programme

In 1999, the LLB applied successfully for the new E.U. Access to Research Infrastructures action of the Improving Human Potential programme (HPRI). Contrary to TMR, this programme is also opened to researchers of countries associated to E.U. (in particular from Central Europe : Poland, Czech Republic, Hungary, etc...). The contract extends for 3 years, starting from february 1st 2000; during the first year of the HPRI contract, we received between june 2000 and january 2001 : 20 teams (30 individual users, among which 10 came from Central and Eastern Europe associated countries), corresponding to 129 days of access.

## 2. BEAM TIME REQUEST AND ALLOCATION

### 2.1. The present organization

We have kept the system of Round Tables and User Selection Panels put in place in 1996, which aimed to favour long-term projects, but have introduced a new Spring Session. In spring 1999, this was limited to E.U. users of the TMR programme, but in 2000 it was extended to all users.

To perform an experiment at LLB, the researcher must first submit a proposal written on a special form, where he explains his scientific interest and describes the proposed experiment. All the proposals submitted at LLB are examined by a peer review Selection Panel, which encounters twice a year (at the end of november and in may), and which is subdivided in 4 sessions :

- Physical Chemistry and Biology,
- Structural Studies and Phase Transitions,
- Magnetism and Superconductivity,
- Disordered Systems and Materials Science.

Each session of the Selection Panel comprises typically 9 members (3 of LLB, 3 French non-LLB, 3 non-french). The list of members for the Selection Panel of autumn 1999 (which selected the experiments to be performed in the first semester of 2000) is given in Table 3.

The Selection Panels classify the proposals in A, B and C, on the basis of scientific merit :

- A : accepted and to be performed,
- B : eventually performed if beam time available,
- C : rejected.

## Experimental Programme and User Activities

The applicant is informed by an official mail, of the classification of his proposal and, in case of success, of the allocated beam time. In case of classification C, the reasons are explained to the applicant.

In the autumn session, the Selection Panels are preceeded by user meetings, called "Tables Rondes du LLB". These meetings consist of :

- invited talks (in each "Table Ronde", half a day is devoted to a specific theme, for example "structure and properties of foams" in session A, and "structure and dynamics of molecular crystals" in session B);
- presentation of new long-term projects or programmes;
- presentation of recent scientific results obtained by external or internal users at the LLB ("poster session");
- technical presentations;
- discussions with users.

Typically 30 persons participate in the average to each of these four "Tables Rondes".

### 2.2. Analysis of the beam time request and allocation

The beam time requests received and the beam time allocated by the spring and autumn User Selection Panels during the year 2000 are summarized per country in Table 4, and per instrument and scientific session in Table 5.

The overload factor of an instrument, defined as the ratio between the required beam time and the foreseen operating time (80% of the operating time of Orphée, the 20% remaining being used for maintenance, repairs, tests, urgent experiments, etc...), depends of the considered instrument and ranges between above 2 (4-circle 5C2, strain scanner G5.2,...) and 1; in average, it is 1.5. These numbers are practically constant since the refurbishment of the ILL reactor (1995).

### 2.3. Fast access procedure

In order to facilitate the access to neutron scattering instruments, in particular for new users, to perform test experiments, to prepare long term projects or to satisfy in a short delay the sample characterization requirements of chemists, a new fast access procedure, for short experiments (typically 1 day), has been set-up since 2000. This concerns in particular powder and small-angle neutron diffraction experiments.

The demands can be made at any moment of the year, by web, adressed to the Scientific Secretariat of LLB. The answer is given with a delay of two weeks, and the experiment performed, either by the proposer or by the local scientific contact, in principle within 2 months.

# Experimental Programme and User Activities

REALIZATION BY INSTRUMENT FOR 1999  
AND 2000

TABLE 1

INSTRUMENTS	1999		2000	
	Number of experiments performed	Beam time (days)	Number of experiments performed	Beam time (days)
<b>TRIPLE-AXIS SPECTROMETERS</b>				
1T (german CRG)*	15	165	11	135
2T	9	119	19	160
4F1	15	192	15	174
4F2	18	173	21	178
G4.3 (austrian CRG)*	9	106	10	103
<b>POWDER DIFFRACTOMETERS</b>				
3T2	42	188	49	188
G4.1	41	197	47	183
G4.2 (russian CRG)*	16	137	27	136
G6.1	17	178	21	179
<b>MATERIALS DEDICATED DIFFRACTOMETERS</b>				
6T1 (textures)	14	179	10	174
G52 (residual stresses) (1/2 Italian CRG )	19	176	18	137
<b>SINGLE CRYSTAL DIFFRACTOMETERS</b>				
5C1	10	185	12	163
5C2 (german CRG)	16	185	29	208
6T2	16	187	19	167
<b>REFLECTOMETERS</b>				
Eros (G3 bis) / Desir (G5 bis)	23	314	24	189
Prism (G2.4)	20	128	14	95
<b>DIFFRACTOMETERS FOR DISORDERED SYSTEMS</b>				
7C2	21	167	24	149,5
G4.4 (ONERA CRG)	5	190	3	200
<b>SMALL ANGLE NEUTRON SCATTERING</b>				
PACE	32	210	37	151
PAXE	42	200	49	198
PAXY	44	207	36	168,5
PAPOL	5	104	4	82
<b>QUASI-ELASTIC SCATTERING</b>				
Spin Echo	10	149	7	142
TV (Mibemol)	20	160	23	185
G1 bis	-	-	10	108
<b>TOTAL</b>	<b>479</b>	<b>4196</b>	<b>539</b>	<b>3953</b>

\* Not included CRG beam time given on 1T to germans, on G4.3 to austrians, on G4.2 to russians

## Experimental Programme and User Activities

REALIZATION BY COUNTRY FOR 1999 AND 2000

TABLE 2

COUNTRIES	1999			2000		
	Number of experiments performed	Beam time (days)	Total experiment beam time ( % )	Number of experiments performed	Beam time (days)	Total experiment beam time ( % )
<b>TOTAL FOR FRANCE</b>	<b>328</b>	<b>2990,5</b>	<b>71,27%</b>	<b>354</b>	<b>2685,5</b>	<b>67,94%</b>
AUSTRIA	7	34	0,81%	10	49	1,24%
BELGIUM	2	11	0,26%	2	6	0,15%
GERMANY	28	193,5	4,61%	44	396,5	10,03%
GREECE	1	16	0,38%	2	14	0,35%
ITALY	20	183	4,36%	25	166	4,20%
NETHERLANDS	4	24	0,57%	6	31	0,78%
PORTUGAL	4	33	0,79%	1	6	0,15%
SPAIN	9	86	2,05%	14	77,5	1,96%
SWEDEN				1	12	0,30%
UNITED KINGDOM	5	31	0,74%	10	46	1,16%
<b>TOTAL FOR E.U.</b>	<b>80</b>	<b>611,5</b>	<b>14,57%</b>	<b>115</b>	<b>804</b>	<b>20,34%</b>
<b>TOTAL FOR RUSSIA-CEI</b>	<b>17</b>	<b>154</b>	<b>3,67%</b>	<b>19</b>	<b>127</b>	<b>3,21%</b>
CZECH REPUBLIC	1	7	0,17%	5	44,5	1,13%
HUNGARY	11	64,5	1,54%	11	68	1,72%
POLAND	15	118,5	2,82%	16	100	2,53%
<b>TOTAL FOR PECO</b>	<b>27</b>	<b>190</b>	<b>4,53%</b>	<b>32</b>	<b>212,5</b>	<b>5,38%</b>
ALGERIA	1	7	0,17%			
AUSTRALIA	1	14	0,33%			
CUBA	1	5	0,12%			
INDIA	1	9	0,21%			
JAPAN	3	37	0,88%	2	26	0,66%
MEXICO	1	7	0,17%			
MOROCCO	5	32	0,76%	5	9	0,23%
SOUTH AFRICA	1	3	0,07%			
SWITZERLAND	7	68	1,62%	9	58	1,47%
UNITED STATES	6	68	1,62%	3	31	0,78%
<b>OTHERS</b>	<b>27</b>	<b>250</b>	<b>5,96%</b>	<b>19</b>	<b>124</b>	<b>3,14%</b>
<b>TOTAL</b>	<b>479</b>	<b>4196</b>	<b>100,00%</b>	<b>539</b>	<b>3953</b>	<b>100,00%</b>

TABLEAU 3

## User Selection Panel - "Tables Rondes" - Autumn 1999



SESSION A : Physical Chemistry, Biology				
LLB MEMBERS	FRENCH MEMBERS		NON-FRENCH MEMBERS	
F. Boué	F. Nallet (Président)	C.R.P.P. Pessac	W. Doster	T.U. München
L.-T. Lee	S. Pouget	I.L.L. Grenoble	G. Hadzioannou	Université Groningen
J. Teixeira	M. Rawiso	I.C.S. Strasbourg	R.E. Lechner	HMI Berlin
SESSION B : Structural Studies, Phase Transitions				
LLB MEMBERS	FRENCH MEMBERS		NON-FRENCH MEMBERS	
J. Etrillard	H. Cailleau	G.M.C.M. Rennes	W.-F. Kuhs	Université Goettingen
M. Braden	E. Elkaim	LURE Orsay	J. Kulda	I.L.L. Grenoble
R. Kahn	A. Hewat (Président)	I.L.L. Grenoble	W. Prandl	Université Tübingen
J. Rodriguez-Carvajal	E. Lorenzo-Diaz	Lab. Cristallog. Grenoble		
SESSION C : Magnetism, Superconductivity				
LLB MEMBERS	FRENCH MEMBERS		NON-FRENCH MEMBERS	
G. André	A. Ivanov	I.L.L. Grenoble	J.C. Gomez-Sal	Université Cantabria
P. Bourges	H. Noël	Université de Rennes I	G. Mc Intyre	I.L.L. Grenoble
C. Fermon	P. Mangin (Président)	LMPSM, Nancy	L. Paolasini	E.S.R.F. Grenoble
A. Goukassov				
P. Pfeuty				
SESSION D : Disordered Systems, Materials				
LLB MEMBERS	FRENCH MEMBERS		NON-FRENCH MEMBERS	
F. Bourée	J.-L. Bechade	SRMA, CEA/Saclay	J.-P. Gaspard (Président)	Université de Liège
C.-H. de Novion	A.J. Dianoux	I.L.L. Grenoble	G. Krexner	Université de Vienne
	F. Hippert	Université Paris-Sud	R. Magli	Université de Florence
	J.-M. Sprauel	ENSAM, Aix en Provence		

Request and allocations (priority A) per country received in the year 2000

TABLE 4

Country	Number of proposals submitted	Beam time requested (days)	Allocated beam time (days) (as priority A)				Total	% of total allocated beam time
			Session A	Session B	Session C	Session D		
FRANCE	284	2904	350	417	553	459,5	1779,5	66,23%
<b>TOTAL FOR FRANCE</b>	<b>284</b>	<b>2904</b>	<b>350</b>	<b>417</b>	<b>553</b>	<b>459,5</b>	<b>1779,5</b>	<b>66,23%</b>
AUSTRIA	10	92,5	0	25	10	25,5	60,5	2,25%
BELGIUM	3	14	7	0	0	0	7	0,26%
GERMANY	37	318,5	50,5	37	79	57,5	224	8,34%
GREECE	1	10	0	0	10	0	10	0,37%
ITALY	34	253,5	11	0	60	18	89	3,31%
NETHERLANDS	4	30	3,5	0	17	0	20,5	0,76%
PORTUGAL	4	24	7	10	0	0	17	0,63%
SPAIN	5	23	0	9	8	5	22	0,82%
SWEDEN	4	33	5	0	0	7	12	0,45%
UNITED KINGDOM	14	97	7	21	18	29	75	2,79%
<b>TOTAL FOR E.U.</b>	<b>116</b>	<b>895,5</b>	<b>91</b>	<b>102</b>	<b>202</b>	<b>142</b>	<b>537</b>	<b>19,99%</b>
MOLDAVIA	1	6	0	0		0		
RUSSIA	23	161	0	7	64	44	115	4,28%
<b>TOTAL FOR RUSSIA-CEI</b>	<b>24</b>	<b>167</b>	<b>0</b>	<b>7</b>	<b>64</b>	<b>44</b>	<b>115</b>	<b>4,28%</b>
CZECH REPUBLIC	3	17,5	3,5	0	0	10	13,5	0,50%
HUNGARY	11	79	7	7	0	13,5	27,5	1,02%
POLAND	22	224	2	10	82	24	118	4,39%
<b>TOTAL FOR PECO</b>	<b>36</b>	<b>320,5</b>	<b>12,5</b>	<b>17</b>	<b>82</b>	<b>47,5</b>	<b>159</b>	<b>5,92%</b>
AUSTRALIA	1	3,5	3,5	0	0	0	3,5	0,13%
INDIA	1	2	0	0	2	0	2	0,07%
ISRAEL	1	3	3,5	0	0	0	3,5	0,13%
JAPAN	8	63	13	0	14	0	27	1,00%
MAROCCO	1	2	0	2	0	0	2	0,07%
SWITZERLAND	4	19	0	0	6	7	13	0,48%
TUNISIA	1	18	0	6	0	0	6	0,22%
UNITED STATES	7	59,5	17,5	17	0	5	39,5	1,47%
<b>TOTAL FOR OTHER COUNTRIES</b>	<b>24</b>	<b>170</b>	<b>37,5</b>	<b>25</b>	<b>22</b>	<b>12</b>	<b>96,5</b>	<b>3,59%</b>
<b>TOTAL</b>	<b>484</b>	<b>4457</b>	<b>491</b>	<b>568</b>	<b>923</b>	<b>705</b>	<b>2687</b>	<b>100,00%</b>

## Request and allocations per instrument received in the year 2000

TABLE 5

INSTRUMENT	Request		Allocated beam time (as priority A)				Total
	Number of proposals	Beam time (days)	Session A	Session B	Session C	Session D	
1T1	15	123	0	47	56	0	103
2T1	15	202	0	28	98	21	147
4F1	19	218	0	68	91	3	162
4F2	10	121	0	21	49	0	70
G4.3	9	108	0	35	0	54	89
TRIPLE-AXIS SPECTROMETERS	68	772	0	199	294	78	571
3T2	33	170	0	75	51	0	126
G4.1	39	181	0	16	104	6	126
G4.2	16	64	0	31	32	0	63
G6.1	28	222	0	19	100	20	139
POWDER DIFFRACTOMETERS	116	637	0	141	287	26	454
6T1	10	206	0	0	0	132	132
G5.2	23	248	0	0	0	95	95
MATERIALS DEDICATED DIFFRACTOMETERS	33	454	0	0	0	227	227
5C1	13	208	0	0	97	0	97
5C2	28	437	0	120	28	0	148
6T2	18	202	0	65	94	0	159
SINGLE CRYSTAL DIFFRACTOMETERS	59	847	0	185	219	0	404
G2.4	13	167	0	0	77	14	91
G3.Bis	21	227	80	0	20	55	155
REFLECTOMETERS	34	394	80	0	97	69	246
7C2	23	185	22	11	4	62	99
G4.4	2	60	0	0	0	60	60
DIFFRACTOMETERS FOR DISORDERED SYSTEMS	25	245	22	11	4	122	159
G5.5			0	0	7	0	7
PACE	32	217	98,5	0	0	28,5	127
PAXE	24	135,5	54,5	0	0	19,5	74
PAXY	41	241,5	91	0	8	21	120
SMALL ANGLE NEUTRON SCATTERING	97	594	244	0	8	69	321
G1.Bis	9	109	19	7	0	29	55
Spin Echo	6	86	56	0	0	28	84
TV	35	307	70	25	7	41	143
QUASI-ELASTIC SCATTERING	50	502	145	32	7	98	282
G4.5	2	12	0	0	0	16	16
NEUTRON RADIOGRAPHY	2	12	0	0	0	16	16
<b>Total</b>	<b>484</b>	<b>4457</b>	<b>491</b>	<b>568</b>	<b>916</b>	<b>705</b>	<b>2680</b>