Final Report

EuroMagNET

A coordinated approach to access, experimental development and scientific exploitation of European large infrastructure for high magnetic fields

Integrating Activity

implemented as

Integrated Infrastructure Initiative

Contract number: *RII3-CT-2004-506239*

Project coordinator: Jan Cornelis Maan – RU-HFML

Project website: *www.EuroMagNET.org*

Project Duration : *24* months from *01/01/2005* to 31*/12/2008*

Project funded by the European Community
under the "Structuring the European Research Area" specific programme
Research Infrastructures Action

A. ACTIVITY REPORT

Project description

Objectives and contractors

It was the purpose of this integrated infrastructure initiative
(a) to co-ordinate the transnational access to three main large infrastructures of high static and pulsed magnetic fields (RU-HFML, Nijmegen, the Netherlands; CNRS-LNCMP, Toulouse, France; and IFW-DD/HLD-FZD, Dresden, Germany), and a number of smaller pulsed-field installations UBER-MG (Berlin, Germany), LVSM (Leuven, Belgium) and LCMIZ (Zaragoza, Spain);
(b) to develop new experimental possibilities at these infrastructures by two Joint Research Activities involving other groups; and
(c) to foster exchange of information between the infrastructures and between various user groups by forming a network of scientific groups using high magnetic fields.

The contractors in the EuroMagNET initiative were: Radboud University Nijmegen (RU, coordinator) the Netherlands, Holon Academic Institute of Technology (HAIT) Israel (for the first two years only), Centre National de la Récherche Scientifique (CNRS) France, Leibniz-Institute of Solid State and Materials Research Dresden (IFW-DD) Germany, National Institute of Chemical Physics and Biophysics (NICPB) Estonia, Forschungszentrum Dresden-Rossendorf e.V. (FZR-IIM) Germany, Katholieke Universiteit Leuven (KUL-R&D) Belgium, University of Oxford (UOXF.DK) United Kingdom, Humboldt University Berlin (UBER) Germany (for the first two years only), and University of Zaragoza - CSIC (ICMA) Spain.

a. Transnational Access

Transnational access was offered to static magnetic fields up to 33 T, and pulsed magnetic fields to the 60-100 T range.
This I3 proposal encompassed practically all of the European activity concerning high magnetic fields in all three areas of Access, Development and Research, and has had a strong integrating effect on the European activities in the area of high magnetic fields, leading to the “EMFL - European Magnetic Field Laboratory” anticipated in the ESF report "The scientific case for a European Laboratory for 100 Tesla Science”, now featuring on the 2008 Roadmap of the European Strategy Forumon Research Infrastructures (ESFRI).

The EuroMagNET initiative has been continued for the years 2009 – 2012, now also including the static magnetic field activities of CNRS in Grenoble.

b. Joint Research Activities

To create new experimental possibilities in order to be able to serve new user communities, and to improve the quality of research in high magnetic fields in Europe, two Joint Research Activities are undertaken. The development programs focussed on high-field NMR and infrared spectroscopy in pulsed fields.

JRA-NMR aimed at developing NMR spectroscopy at very high magnetic fields in resistive magnets up to 40 T and in pulsed magnets to 60 T. The project united all high-field NMR initiatives in Europe. The JRA-NMR was managed by the Solid State NMR group at the

Radboud University in Nijmegen. Partners were the Grenoble High Magnetic Field Laboratory, the National Institute of Chemical Physics and Biophysics in Tallinn, and the pulsed field facility in Dresden.

The three major work-packages in the development of the high-field NMR were:

WP-R1.1	High-resolution solid-state NMR in resistive magnets
WP-R1.2	Multi-frequency NMR at low temperatures
WP-R1.3	NMR in pulsed magnetic fields

JRA-IR aimed at improving infrared (IR) spectroscopy techniques with pulsed magnetic fields at frequencies which coincide with typical energies of cyclotron resonance and spin resonance at fields in the 20-100 T range. An important longer term goal was to make experiments possible which combine Free Electron Lasers (FEL) as a source of IR radiation with pulsed fields. The project already plays an essential role in the new Hochfeld Magnetlabor of the Forschungszentrum Dresden-Rossendorf with its 50 MJ pulsed field installation since the FEL there is directly adjacent.
The JRA-IR was managed by the Institute of Ion Beam Physics and Materials Research at the Forschungszentrum Dresden-Rossendorf. Partners were the Laboratoire National des Champs Magnétiques Pulsés in Toulouse, the Katholieke Universiteit Leuven and the University of Oxford.

The three major work-packages in the development of the pulsed field infrared spectroscopy were:

WP-R2.1	Novel IR sources and detectors
WP-R2.2	ODR spectroscopy
WP-R2.3	Ultrafast and time-domain THz spectroscopy

c. Networking activites

Science in high magnetic fields covers a broad spectrum since a magnetic field constitutes a very general, thermodynamic parameter applicable to systems in combination with many different experimental techniques. Therefore the community of researchers using high magnetic fields as an important tool for their research is vast and varied. The Science Collaboration Network (SCN) was set up to stimulate exchange of knowledge, information and techniques among this wide community and to establish a competitive European scientific user community.

The SCN had the following activities:
1. An exchange program with bilateral research visits for collaboration and/or training of young scientists;
2. A number of topical workshops, about one per year, centered around a specific research topic or around a new experimental technique;
3. A school for young scientists (100 participants) to teach physics in high magnetic fields;
4. A 'delocalised' theory support group.

The bilateral exchange program has permitted the secondment of scientists between institutions, for typically several weeks to a few months, and this program was especially useful to operate a “distributed” theory group. However, due to the early death of professor Israel Vagner, the European Interactive Center could not be fully developed and was discontinued end of Year-2, and the secondment of theorists was combined with the other secondment program, coordinated by RU.

Project results

Transnational Access

Access to continuous fields at RU-HFML, to pulsed fields at CNRS-LNCMP, IFW-DD, FZD-HLD, LVSM, LCMIZ or UBER-MG was given, provided that a research proposal for access was positively rated by a User Selection Panel based on the following selection criteria:

(i) scientific quality, relevance and originality of the proposal;
(ii) necessity for the use of of magnetic field strengths uniquely available at the infrastructures;
(iii) track record of the user group, in particular proper reporting on possible earlier experiments;
(iv) proper preparation by preliminary studies at lower fields at their home-institutions or elsewhere.

The actual execution of the proposal also depended on availability, feasibility and ranking of the proposed research. Access involved the use of the installation, the use of all available auxiliary equipment and (if necessary) support by local staff. Eligible groups from EU countries and associated countries were also offered support for travel and local expenses.

In the four years of the contract more than 1700 magnet-hours of transnational access to static magnetic fields were delivered (all at RU-HFML), and more than 3750 shots to very high magnetic fields with pulsed magnets (see Figure 1, 65% at CNRS-LNCMP alone).

Implementation of specific activities to provide transnational access, M1-M48							
			Proposal		**realization**		
Participant No	**Organi-sation**	**Infra-structure**	**Minimum quantity**	**Estimated No users**	**TNA delivered**	**No projects**	**No users**
1	RU	RU-HFML	1020 hours	45	1710.0	55	102
Total static fields			1020 hours		1710.0	55	102
1	RU	RU-HFML	60 shots	8	0	0	0
3	CNRS	CNRS-LNCMP	1200 shots	120	2445	74	68
4	IFW-DD	IFW-DD	245 shots	18	638	15	16
6	FZD	HLD	0 shots	0	133	9	10
7	KUL-R&D	LVSM	240 shots	18	362	11	20
9	UBER	UBER-MG	60 shots	10	63	6	4
10	LCMIZ	LCMIZ	60 shots	10	132	5	8
Total pulsed fields			1865 shots		3773	120	126

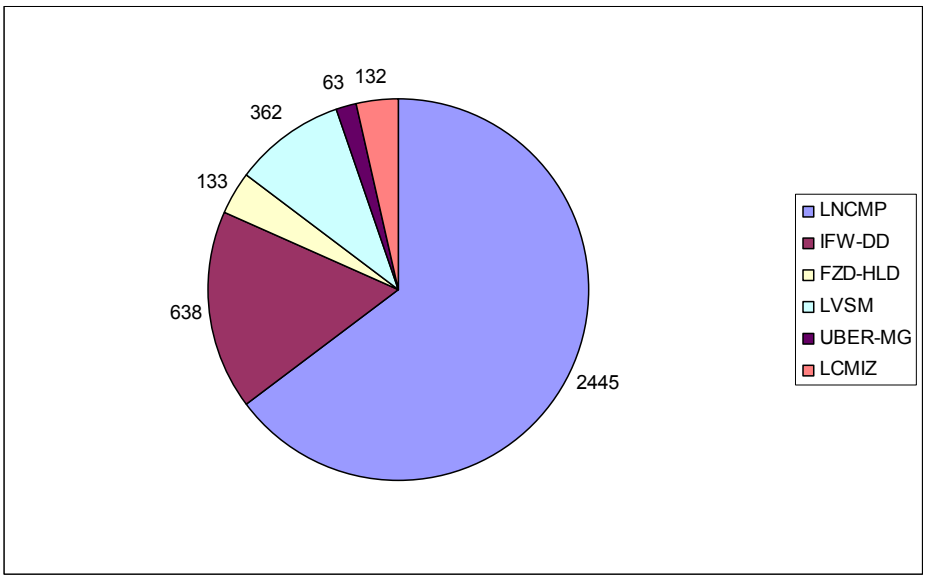


Fig 1. Distribution of the 3773 magnet-shots over the different pulsed field installations

In the period 151 different projects were executed (i.e. of the 175 projects in the Table above, 24 projects appeared in more than one of the reporting periods), involving about 170 (different) visiting scientists (i.e. of the 228 users listed in the Table above, a significant fraction have come to the installations in more than one reporting period, or for more than one project). The visiting scientists were associated with 77 different user groups from 19 different member states.
The guest researchers benefitting from the TNA programme have spent a total of 2206 days at the installations, i.e. a typical stay of 1-2 weeks.

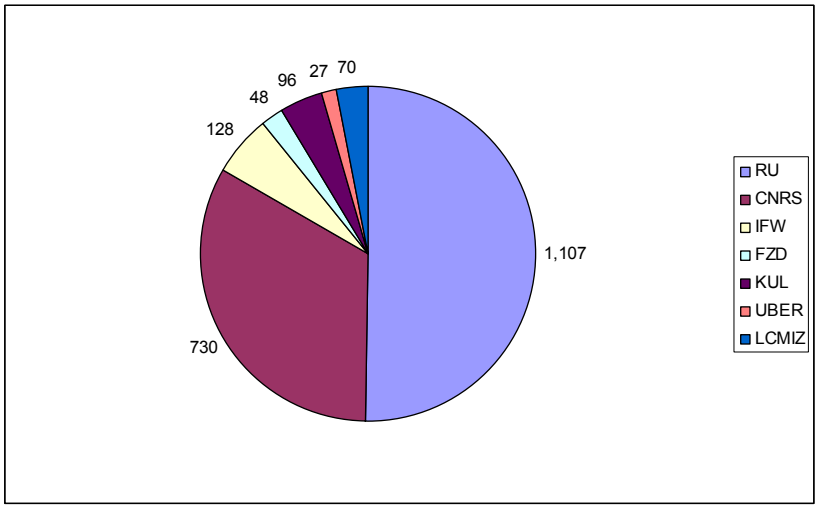


Fig 2. Distribution of the 2206 days spent by the guest researchers at the different installations.

All projects proposed to be carried out at the major installations, including those of in-house scientists and graduate students, were submitted to an evaluation by the User Selection Panel in order to determine their scientific relevance and eligibility, and to provide a handle for prioritization by the infrastructures. The User Selection Panel was composed of specialists with a wide-spread range of research interests, and from a number of different countries, who are reasonably familiar with one or more of the infrastructures. The judgement of the User Selection Panel was considered by the Coordination Board and accepted with minor amendments; then the infrastructures were informed of the averaged rating and asked to properly inform the proposers, and in particular take steps to schedule the proposed research, or inform the proposers why their proposal will not be carried out.

In many cases a much more restricted access was granted than the proposers had originally requested, i.e. a reduction of number of magnet-hours or magnet-shots.

The access offered to the community was about double the access that could be charged within the budget, and for RU-HFML also the number of different users was more than double the original target. These facts illustrate the significant need there is in Europe for access to the highest magnetic fields.

The most notable achievements were
a) the discovery of the quantum Hall effect in single- and bilayer graphite samples, and the observation that the quantum Hall effect persists to room temperature in graphene, by the Manchester group at RU-HFML;
b) the establishment of the phase diagram of the frustrated antiferromagnetic triangular metal $AgNiO_2$, by the Bristol group at RU-HFML.
c) the observation of multiple Shubnikov-de Haas oscillations in underdoped YBaCuO superconductor, at CNRS-LNCMP;
d) demonstration of critical fields over 70 T in carbon-doped thin films of MgB_2; by the Genova group at CNRS-LNCMP
e) observation of quantum oscillations in overdoped $Tl_2Ba_2CuO_{6+\delta}$, at CNRS-LNCMP.

a. The Quantum Hall effect in graphene

The newly discovered, truly 2-dimensional system of one and two-monolayers thick films of graphite presents an interesting and previously unachievable case of linear (relativistic) dispersion relation for quasi-particles, so their behaviour is described by the relativistic Dirac equation, rather than the Schrödinger equation. In particular, this leads to an unusual case of quantum Hall effect (QHE) - half-integer QHE in case single-layer graphene, and strong degeneracy of Landau levels around the Dirac point (bottom of conductance zone) [K.S. Novoselov, E. McCann, S.V. Morozov, V.I. Fal'ko, M.I. Katsnelson, U. Zeitler, D. Jiang, F. Schedin and A.K. Geim, Nature Physics **2**, 177 (2006)]:

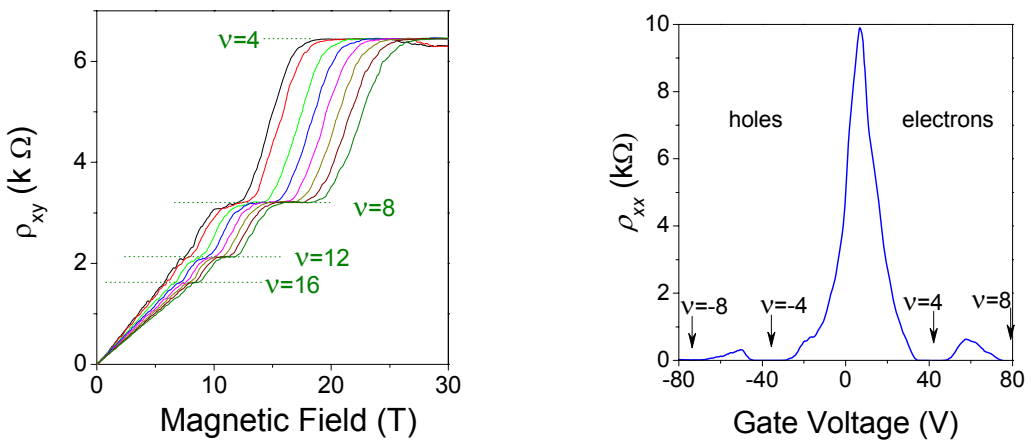


Fig. 3. left: Hall resistance ρ_{xy} of bi-layer graphene for different electron concentrations, showing plateaus at four-fold degenerate Landau levels; right: Longitudinal resistance ρ_{xx} of bi-layer graphene for varrying carrier concentration, both holes and electrons, at 4 K and 30 T.

A spectacular consequence of the peculiar bandstructure in graphene is that the quantum Hall effect (actually a typical low-temperature phenomenon) surprisingly becomes observable at room-temperature, see Figure 4c [K.S. Novoselov, D. Jiang, B. Zhang, S.V. Morozov, H.L. Stormer, U. Zeitler, J.C. Maan, G.S. Boebinger, P. Kim and A.K. Geim, Science **315**, 1379

(2007)]. This effect was first observed at the HFML in Nijmegen and shortly later also at the NHMFL in Tallahasssee FL.

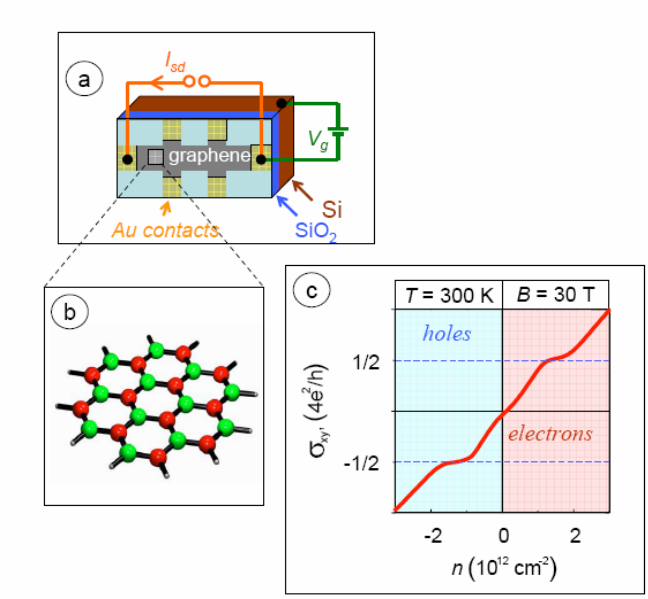


Fig. 4. a: Field effect transistor made from graphene on a SIMOX substrate; b: Honeycomb lattice of graphene; c: The room-temperature Hall conductivity is quantized at half-inter values of (4e2/h).

b. The frustrated antiferromagnetic triangular metal $AgNiO_2$

The dHvA effect was measured (see inset Figure 5, left) in small single crystals of $AgNiO_2$ by using a piezocantilever torque method down to temperatures as low as 0. 5 K and fields up to 33 T. The observed quantum oscillations determined by the conduction electrons give evidence for a rich behavior in field with several new phases stabilized at high field, and based on the magnetic, transport and thermodynamic data a new phase diagram for $AgNiO_2$ can be proposed, as shown in Figure 5 (right).

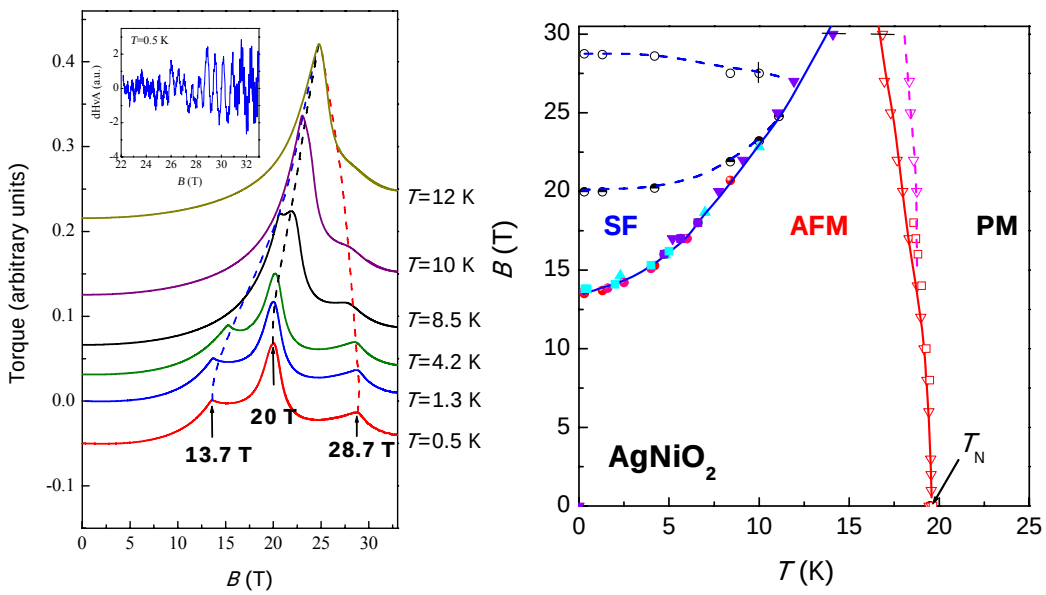


Fig 5. left: Torque signal of $AgNiO_2$ measured at different temperatures. The inset shows the dHvA signal at 0.5 K; right: The phase diagram of $AgNiO_2$ obtained from torque, transport and thermodynamic data indicating different magnetic phases: antiferromagnetic (AFM), spin-flop (SF) and paramagnetic (PM).

c. SdH oscillations in underdoped YBaCuO

High-temperature superconductivity in copper oxides occurs when the materials are chemically tuned to have a carrier concentration intermediate between their metallic state at high doping and their insulating state at zero doping. The underlying evolution of the electron system in the absence of superconductivity is still unclear, and a question of central importance is whether it involves any intermediate phase with broken symmetry. The Fermi surface of the electronic states in the underdoped 'YBCO' materials $YBa_2Cu_3O_y$ and $YBa_2Cu_4O_8$ was recently shown to include small pockets [N. Doiron-Leyraud, C. Proust, D. LeBoeuf, J. Levallois, J.-B. Bonnemaison, R. Liang, D.A. Bonn, W.N. Hardy and L. Taillefer, Nature **447**, 565-568 (2007)], in contrast with the large cylinder that characterizes the overdoped regime, pointing to a topological change in the Fermi surface.
A negative Hall resistance was observed (see Figure 6, left) in the magnetic-field-induced normal state of $YBa_2Cu_3O_y$ and $YBa_2Cu_4O_8$, which reveals that these pockets are electron-like rather than hole-like.
In order to determine whether there are other closed FS, which is of fundamental importance to clarify the FS of HTSC in the pseudogap phase, a team from the University of Bristol, together with scientists from the Université de Sherbrooke, the LNCMP and International Superconductivity Center in Tokyo, have performed high-precision measurements of the de Haas-van Alphen effect in underdoped $YBa_2Cu_3O_y$.

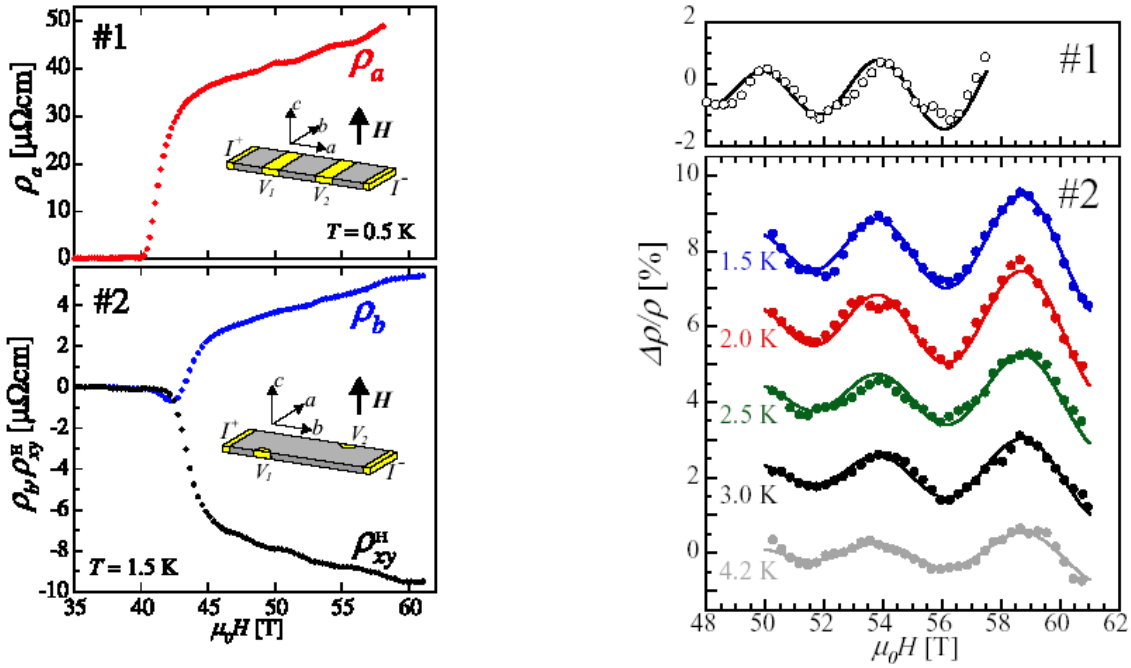


Fig 6. Longitudinal and Hall data (ρ_{xx}, ρ_{xy}); the right hand panel shows the oscillatory part of the magnetoresistance at various temperatures.

A broad peak with a maximum around 535 T is observed [A.F. Bangura, J.D. Fletcher, A. Carrington, J. Levallois, M. Nardone, B. Vignolle, P.J. Heard, N. Doiron Leyraud, D. Le Boeuf, L. Taillefer, S. Adachi, C. Proust and N.E. Hussey; Phys. Rev. Lett. 100,047004 (2008)], in agreement with previous results (see Figure 7). The main frequency, so far believed to be a single frequency, is in fact composed of three closely spaced frequencies: F_1 = 540 T (black line in Figure 5) and two satellites F_2 = 450 T (green line) and F_3 = 630 T (purple line). We attribute these frequencies to bilayer effect and corrugation of the FS, which point out for the first time in an underdoped cuprate the coherence of the quasiparticle along the interplane direction at low temperature.

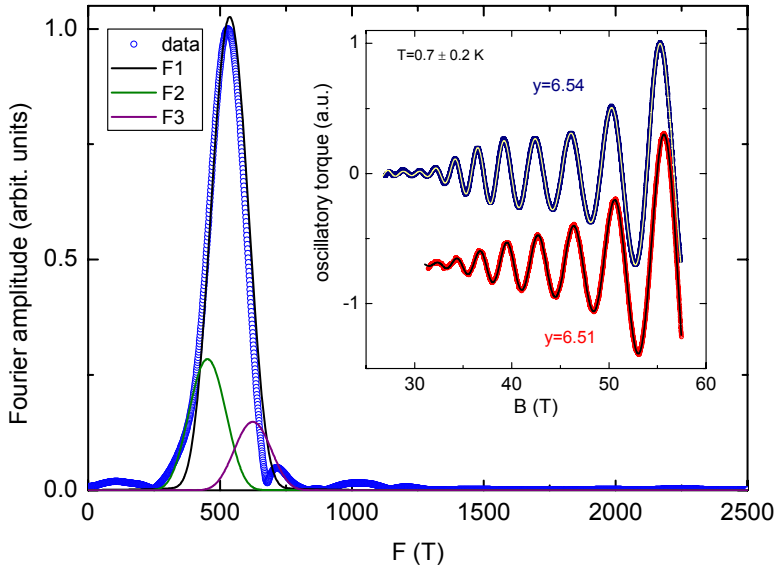
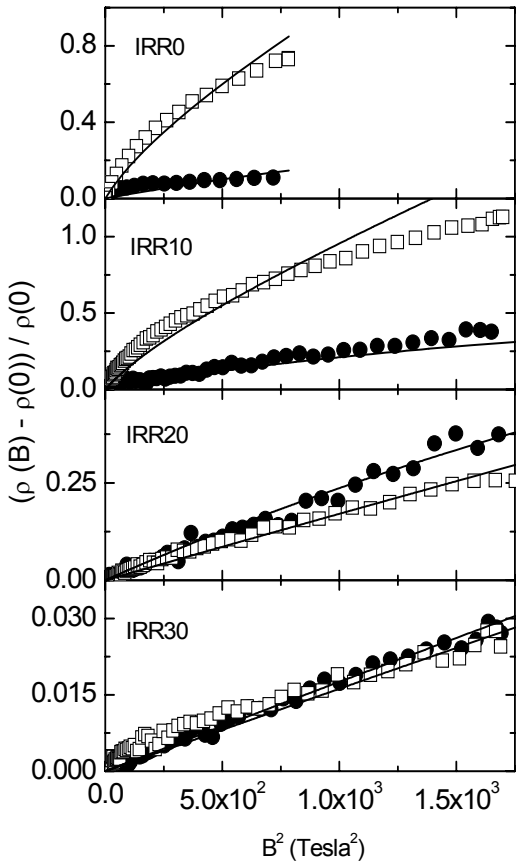


Fig 7. Fourier analysis of the oscillatory torque (see inset) for underdoped $YBa_2Cu_3O_{6.54}$.

d. critical fields in carbon-doped thin films of MgB_2



Magnesium diboride (MgB_2) is a conventional superconductor with an astonishingly high critical temperature of 40 K. The crucial characteristic in enabling conventional phonon- mediated superconductivity up to such high temperatures is the multiband transport in MgB_2; hence the importance of exploring transport in the two different types of bands, namely the π bands formed by the p_z orbitals of boron atoms, which are three-dimensional and weakly coupled to phonons, and the σ bands formed by sp^2-hybridized orbitals stretched along boron-boron bonds, which are two-dimensional and strongly coupled with the optical E_{2g} phonon mode.

Fig 8. Experimental magnetoresistivity curves for the $B \perp ab$ (open squares symbols) and $B \parallel ab$ (filled round symbols) configurations; fitting curves are shown as continuous lines. The values of neutron fluence in ions/cm^2 for the different samples, from the top panel to the bottom one, are 0, 6.4×10^{15}, 6.5×10^{16}, 7.7×10^{17}, with respective critical temperatures from 41 K down to 36 K.

To resolve the puzzling problem of the upper critical field in MgB_2 thin films, measurements were done on a set of samples in which neutron irradiation had induced a controlled amount of disorder. The extremely high observed values of B_{c2} turn out to be rather independent of the experimental resistivity, at least at low fluences.

In order to probe the multiband character in MgB_2, also the normal state magnetoresistivity has been studied (see Figure 8) [V. Braccini, A. Gurevich, J.E. Giencke, M.C. Jewell, C.B. Eom, D.C. Larbalestier, A. Pogrebnyakov, Y. Cui, B.T. Liu, Y.F. Hu, J.M. Redwing, Q. Li, X.X. Xi, R.K. Singh, R. Gandikota, J. Kim, B. Wilkens, N. Newman, J. Rowell, B. Moeckly, V. Ferrando, C. Tarantini, D. Marre, M. Putti, C. Ferdeghini, R.Vaglio, E. Haanappel, Phys. Rev. B **71**, 012504 (2005) ; I. Pallecchi, V. Ferrando, E.

Galleani D' Agliano, D. Marre, M. Monni, M. Putti, C. Tarantini, F. Gatti, H.U. Aebersold, E. Lehmann, X.X. Xi, E.G. Haanappel, C. Ferdeghini, Phys. Rev. B **72**, 184512 (2005)].
A quantitative analysis of experimental data based on a multiband cyclotron orbit theory within the anisotropic effective mass approximation allowed to extract the scattering times in the two types of bands, τ_π and τ_σ, which account for the B_{c2} behavior.

e. Quantum oscillations in overdoped $Tl_2Ba_2CuO_{6+\delta}$

The nature of the metallic phase in the high-temperature superconductors (HTSC), and its evolution with carrier concentration, has been a long-standing mystery. A central question is how coherent electronic states, or quasiparticles, emerge from the antiferromagnetic insulator with doping. Scientists of the LNCMP, in collaboration with scientists from the University of Bristol and the University of St. Andrews, have recently reported quantum oscillations in overdoped $Tl_2Ba_2CuO_{6+\delta}$ confirming the existence of a large Fermi surface of well-defined quasiparticles [B. Vignolle, A. Carrington, R.A. Cooper, M.M.J. French, A.P. Mackenzie, C. Jaudet, D. Vignolles, C. Proust and N.E. Hussey, Nature **455**, 952-955 (2008)].

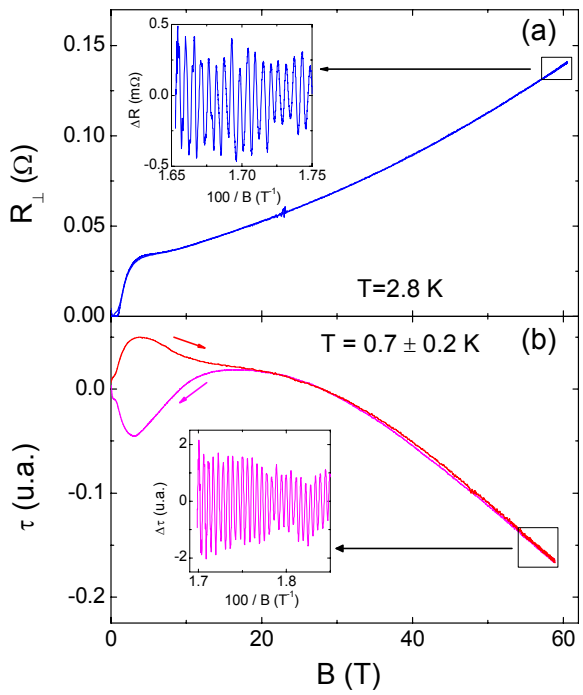


Fig. 9. Raw data of interlayer magnetoresistance of $Tl_2Ba_2CuO_{6+\delta}$ (top) and torque (bottom) versus magnetic field. The insets show a magnified view of the oscillatory component of each quantity.

These measurements offer strong support for the scenario that beyond a critical doping level within the superconducting dome, the pseudogap vanishes, i.e. the pseudogap and the superconducting gap are not coincident in the overdoped regime, and confirm that, in overdoped HTSC, coherence is established at all Fermi wavevectors and they also firmly establish the applicability of a generalized Fermi liquid picture on the overdoped side of the superconducting phase diagram.

JRA-NMR

WP-R1.1 High-resolution solid-state NMR in resistive magnets

For the observation of NMR in resistive magnets improvements must be made of the spatial and temporal homogeneity. The team at Nijmegen developed a D_2O mapping probe with stepper motor control and synchronization with a Varian infinity plus NMR console, and improved the field homogeneity using a ferroshim (see Figure 10).

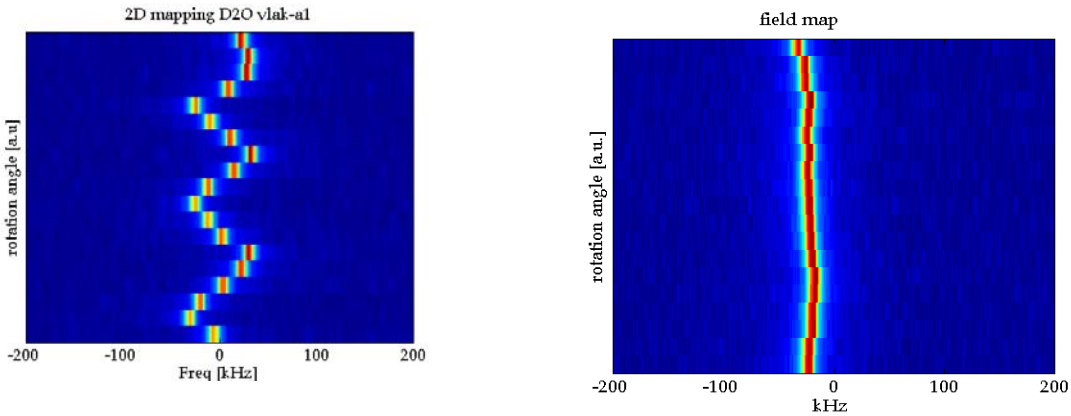


Fig. 10. Field mapping at 30 T, using a home-built motorized D probe with the sample 5 mm off axis. On the left: Field variations for two rotations around the field axis. On the right, same curve after compensating the linear *x,y* gradient by in plane adjustment of the ferroshim position. Field variations are now dominated by fluctuations and drifts in the current and/or temperature of the coil.

It was first proposed to improve the temporal stability by a feedback on the 20 MW power converters. A fast feedback on the NMR electronics proved to be more opportune. To achieve the required level of stability for better than 1 ppm resolution (see Figure 11), the MAS probe was modified to a three channel version which allows real time field monitoring on a Deuterium signal of a reference sample located inside MAS rotor (collaboration RU-NMR and NICPB). Deuterated ammonium chloride was selected for this purpose, which indeed proves to be an excellent reference sample in terms of sensitivity, T_1 (repetition rate) and T_2 (resolution, FID lifetime). On the spectrometer side a homebuilt option was implemented for triple channel acquisition. This gives the unique advantage to measure with high accuracy the temporal field fluctuations simultaneous in space and time with the sample under investigation. A major modification on the spectrometer hardware was the implementation of a so-called 'followB' method, a special kind of frequency lock so that all spectrometer frequencies follow the temporal fluctuations in the field.

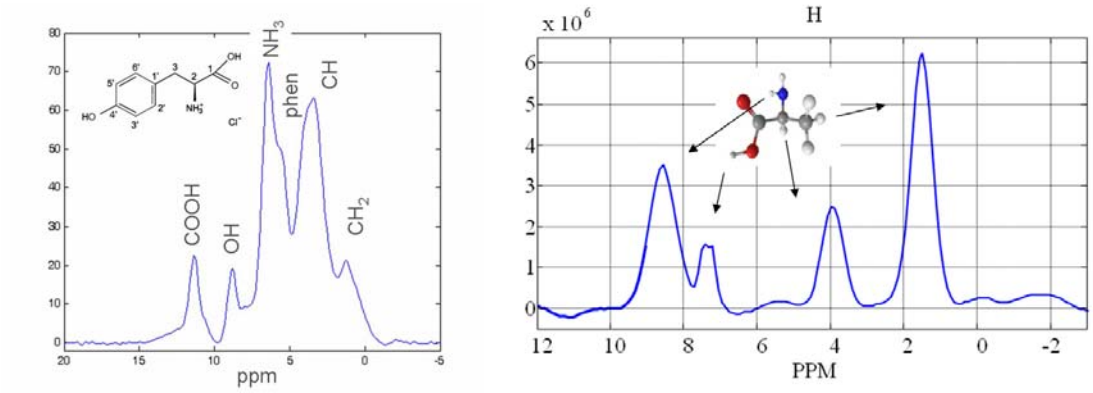


Fig. 11. Tyrosine proton spectrum (left) and L-Analine (right) at 1277 MHz (30 T), single scan, resolution below 1 ppm.

The long term field stability at a set point of 30 T is about 100 ppm. With the slow field lock we achieve a field stability of 7 ppm (Gaussian). The followB NMR frequency lock reduces this to 0.7 ppm effective resolution for prolonged averaging (typically one hour, 3600 scans). With postprocessing of the data using reference deconvolution, the final effective resolution for routine experiments is 0.3 ppm, which is basically limited by the natural linewidth of the deuterated salt that is used as reference material. For most solid state NMR experiments this is an adequate resolution.
It was also demonstrated that 2D NMR spectroscopy is feasible at 30 T (see Figure 12).

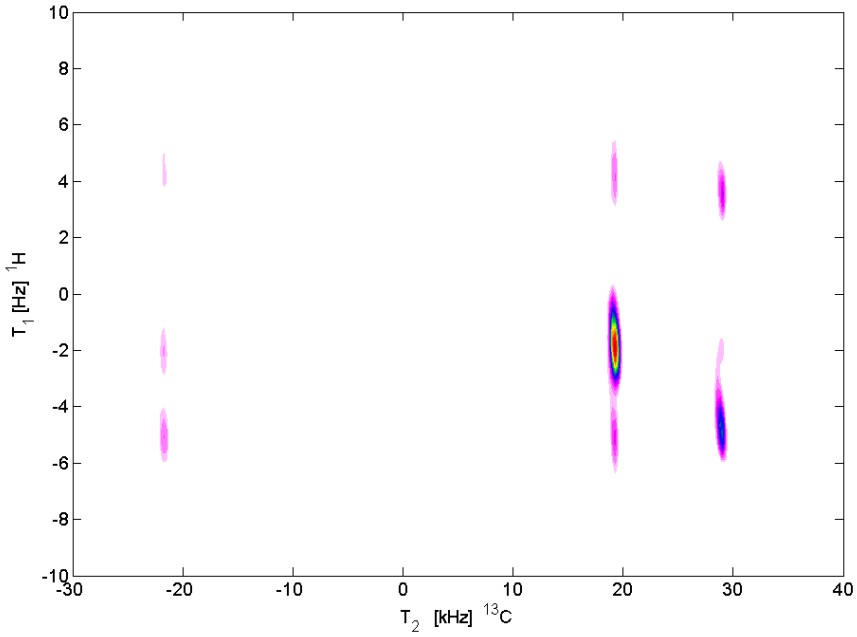


Fig. 12. 2D Hetero nuclear correlation spectrum (1H-13C) of L-alanine using a conventional cross polarization pulse sequence, measured at 30 T. The proton and carbon resolutions are about 1 ppm, although the short term fluctuations were about 20 ppm. The field drift during the 30 minutes of data acquisition was about 50 ppm.

WP-R1.2 Multi-frequency NMR at low temperatures

At CNRS-GHMFL the emphasis was on probes for low temperatures and with sample rotation (see Figure 13) and multi-frequency NMR (see Figure 14).

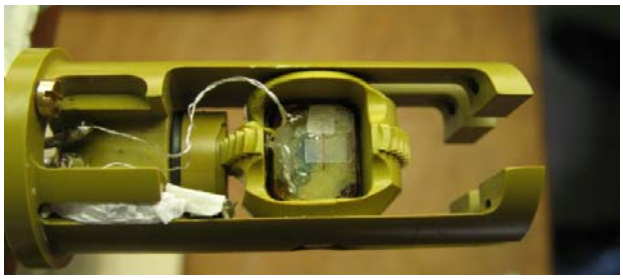


Fig. 13. 40 mK goniometer for NMR experiments to the highest fields.

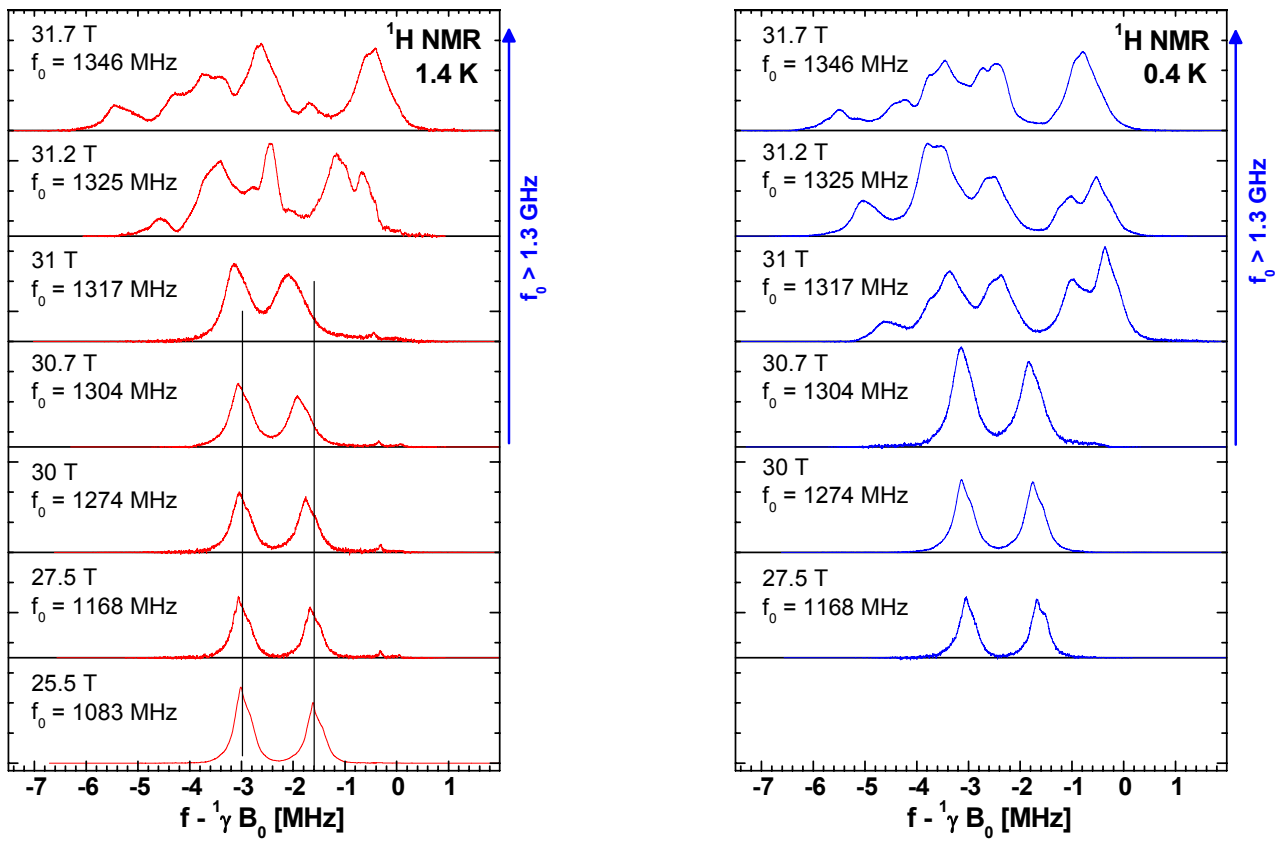


Fig. 14. Azurite 1H NMR spectra obtained at 1.4 K (left) and 0.4 K (right) in magnetic fields between 25.5 and 31.7 T. The corresponding Larmor frequencies range from 1083 MHz up to 1346 MHz.

WP-R1.3 NMR in pulsed magnetic fields

Until recently pulsed magnets had not attracted attention from the NMR community since the magnetic field varies rapidly both in time and in space, and several attempts to record NMR signals resulted in failure. However, the Haase group in Dresden reported the first spectra of 63Cu NMR at fields up to 33T (370 MHz Larmor frequency) by using a pulsed field magnet. By calibrating the pulsed field sources and developing specially adapted NMR probes, 2H NMR signals were reported at fields up to 58 T (380 MHz).

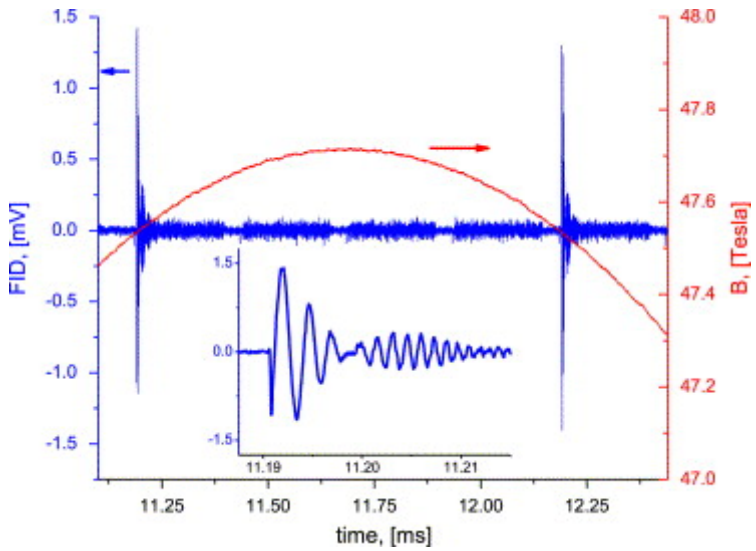


Fig. 15. ^{1}H NMR at 2.027 GHz in a 50 T pulsed field magnet. Red: pulsed field curve near its maximum. Blue: five segment (see text) NMR receiver trace (real part) over the same period of time; a free induction decay is observed after the first and fifth RF pulse. Inset: blow-up of the first free induction decay.

Having observed NMR spectra at the highest achievable fields (60 T) but at moderate frequencies (<400 MHz), the next challenge was the construction of a complete data acquisition system for obtaining ^{1}H NMR data above 2 GHz. The pulsed magnet used for our experiments consists of a 50 T, 340 kJ, 24 mm bore short-pulse coil at the IFW in Dresden that has a length and diameter of about 20 cm. It is energized by a 1 MJ capacitor bank. The main coil bore (24 mm) carries a cryostat (Cryogenic Limited, London) for adjusting the sample temperature between 1.8 and 330 K. Inside the cryostat and center field region an insert carries sensors for measuring the temperature, magnetic field and magnetization.

The home-built NMR probe was based on a small solenoid, four turns of 100 µm diameter copper wire wrapped around a fused silica capillary of outer diameter 700 µm, inner diameter 530 µm. The capillary was filled with a 3:1 H_2O:D_2O aqueous solution that contained $GdBr_3$ such that the ^{1}H spin–lattice relaxation time T_1 was about 200 µs. Since the cryostat operates under a low vacuum, the ends of the capillary were sealed with epoxy. The small size of the coil and sample is advantageous in terms of having a high excitation bandwidth, and for minimizing the spatial inhomogeneity of the magnetic field within the sample.

Figure 15 shows a recording of the NMR resonance at 2 GHz on a millisecond timescale near the peak of a magnetic field pulse to 47.7 T.

JRA-IR

WP-R2.1 Novel IR sources and detectors

In the JRA-IR project a compact spectrometer for infrared spectroscopy in pulsed magnetic fields was built and demonstrated.

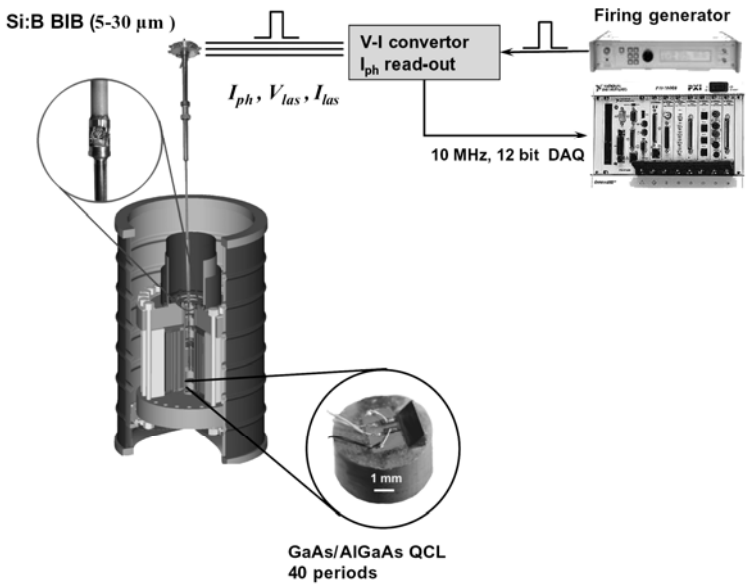


Fig. 16. Compact CR spectrometer including a QCL and a Si BIB detector.

The use of quantum cascade lasers (QCL) as mid-infrared (MIR) excitation source of cyclotron resonance have been demonstrated for pulsed magnetic field experiments in which the QCL is placed close to the magnet bore centre. Three QCL devices emitting at 9, 11 and 15 µm wavelength were tested in a residual pulsed field as high as 15 T. On the other hand, Si:B blocked impurity band (BIB) photodetectors were also demonstrated to be poorly sensitive to high magnetic fields. As a result, the combination of QCL sources and Silicon BIB detector gives rise to a compact resonance spectrometer in the excitation range 8- 40µm and magnetic field range 0-60T.

WP-R2.2 ODR spectroscopy

In a collaboration between Leuven and Toulouse also a fiber-base ODR system was designed and developed (see Figure 17), and ODR at longer wavelengths was further explored in Oxford.

Test measurements were carried out on a 30 µm thick n-type InSe at 4.2 K. The sample was illuminated by 118 µm radiation from a CO_2 pumped fir laser delivering up to 10 mW. The photoluminescence signal was excited by 532 nm laser line giving up to 100 mw at the end of the fiber. The PL signal was recorded along the downsweep of a 40 T pulse the magnetic field during 300 ms and at 7 ms intervals. The cyclotron resonance line was recorded by measuring the voltage across the photoconductor.

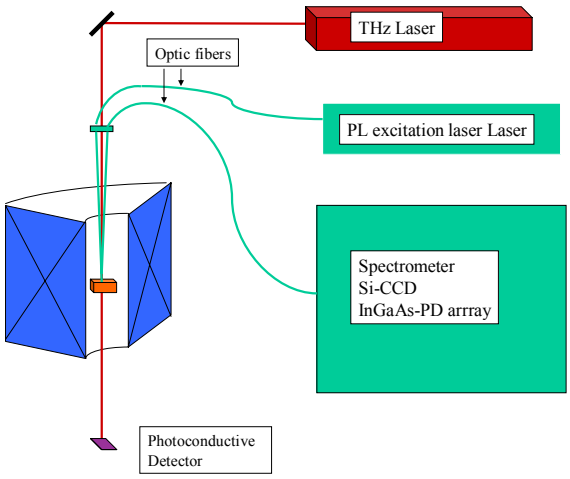


Fig. 17. Schematic view of the ODR experimental set up based on a pulsed magnetic field.

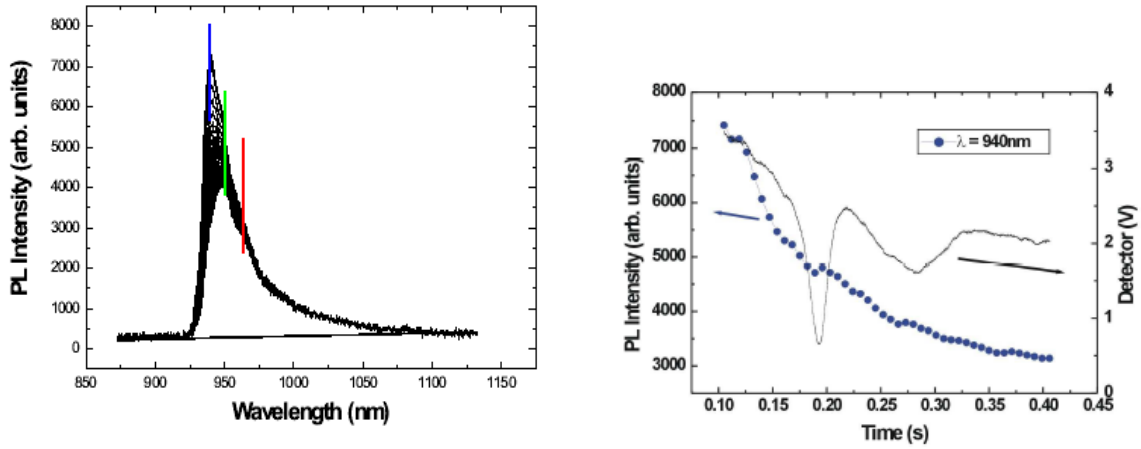


Fig. 18. (a):PL spectra of the n-InSe sample recorded at 7 ms intervals from 32 to 0 T at 4 K; (b): FIR transmission across the n-InSe sample (right scale) and PL intensity change during the magnetic field decay (left scale).

WP-R2.3 Ultrafast and time-domain THz spectroscopy

The light of a Free Electron Laser in Dresden was coupled to pulsed field magnets and successfully used for magneto-spectroscopic experiments in very high pulsed magnetic fields. The installations for guiding the FEL into the magnet lab have been completed and transport of the FEL beam over the 50m to the magnet lab has been demonstrated over a large wavelength range (from 5 to 200 µm) with acceptable losses.
The first demonstration experiments have been performed: cyclotron resonance absorption in a GaAs/AlGaAs superlattice using a FEL wavelength of 88 µm (see Figure 19). It turned out to be necessary to include two parallel lightpipes with two detectors in the sample stick. In this way the signal transmitted through the sample and a reference signal can be recorded simultaneously. The latter is used for normalization, which is necessary due to signal fluctuations.

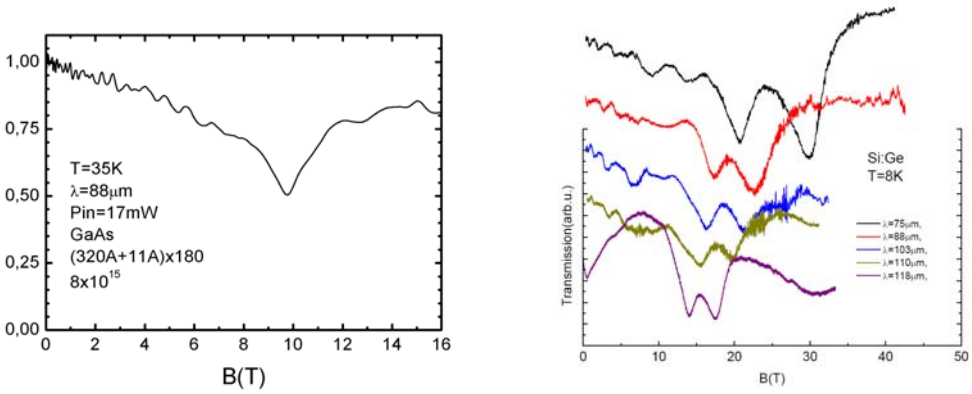


Fig. 19. (left) Cyclotron resonance of a GaAs/AlGaAs superlattice measured with the FEL at a wavelength of 88 μm in the pulsed magnetic field; (right) Selected FEL based transmission curves of Ge/SiGe quantum wells as a function of magnetic field, measured under free electrons laser excitation.

Networking activities

In the bilateral exchange program a basic contribution of € 2000.00 per month was offered to permit the secondment of scientists between institutions, for typically several weeks to a few months. The total volume of secondments over the duration of the project was about 48 person-months, and an additional 32 person-months to build a 'delocalized theory support group' (which may be seen as a counterpart of the theory group at the Tallahassee National High Magnetic Field Laboratory (NHMFL) of professors R.J. Schrieffer and L.P. Gor'kov). Unfortunately the early decease of professor Israel Vagner, who would coordinate the 'delocalized theory support group', this initiative was not fully developed.
Over the duration of the contract 38.2 person-months of secondment have been sponsored, and 16 individuals have benefitted through this activity.

The workshops organized by EuroMagNET were:

- Molecular Materials in High Magnetic fields, Nijmegen NL, June 2005, 40 participants.
- Synchrotron applications of high magnetic fields, October 2006, Grenoble FR, 40 participants.
- Science in high magnetic fields, Nijmegen NL, October 2007, 40 participants
- Physical phenomena in high magnetic fields, August 2008, Tallinn EE, 90 participants (EuroMagNET sponsoring).
- Correlated electron systems in high magnetic fields, October 2008, Dresden DE, 75 participants.
- Semiconductors and carbon-based nanostructures in magnetic fields, November 2008, Grenoble FR, 40 participants.

A school for young scientists was held in Cargese on Corsica, 27 August – 8 September 2007, 90 participants.

Dissemination and use

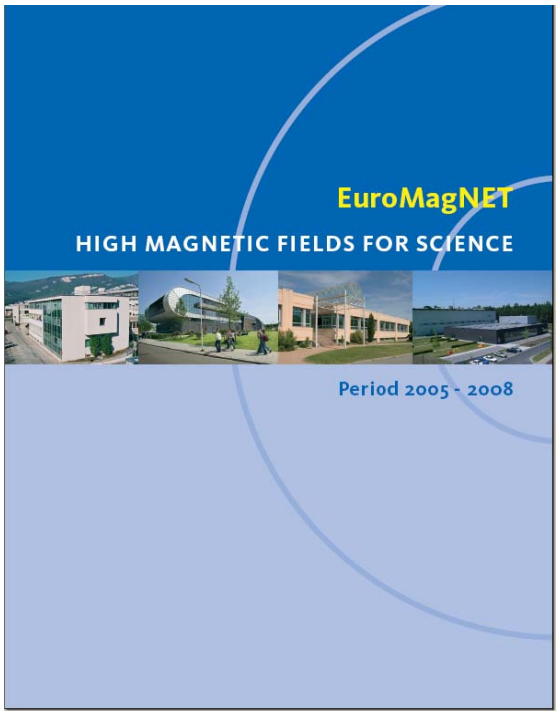
All results obtained by the EuroMagNET oartners and the users that had access to the installations through the TNA activity are in the public domain. They can be found on the website www.EuroMagNET.org (now pointing at the call for proposals page of EuroMagNET-II, with a link to EuroMagNET-I website, with reports and highlights) and have been or will be published in the open literature.

The experience gained and improved measurement techniques continue to be available for qualified users of the participating infrastructures through EuroMagNET-II (FP7 contract 228043).

The logo adopted by EuroMagNET, with only minor changes features for the successor programme EuroMagNET-II as well:

A glossy report was printed “EuroMagNET, high magnetic fields for science; Period 2005-2008” for a scientifically educated but non specialist audience which contains the following activities of the EuroMagNET:

- Short description of the infrastructures involved;
- Short reports of progress of the scientific projects carried out at the three Large Infrastructures HFML, LNCMP and HLD/IFW;
- Reports on the progress of the two JRA programs;
- Lists of publications, workshops, exchange visits and transnational access offered.



Also a folder was produced and widely distributed by mail and at conferences to attract the interest of potential users of the four main high magnetic field infrastructures.

B. FINAL MANAGEMENT REPORT (FINANCIAL INFORMATION)

The coordinator will also submit, within 45 days of the end of the project a Final summary financial report consolidating the costs of all the contractors taking into account any adjustments made by the Commission, in an aggregate form covering the entire duration of the project. This report must be submitted as separate document in the format given in ***Appendix 4 - Summary financial report****. In addition a table of the human effort per partner and activity along the entire duration of the project should be provided as separate document using the format given in* ***Appendix 5*** *].*

Summary Financial Report

Type of Instrument	I3	Project Title (or Acronym)	EuroMagNET	Contract N°	
Reporting period number	final	From (dd/mm/yyyy)	1-Jan-05	To (dd/mm/yyyy)	31-Dec-08	Page	1/1

Contractor n°	Organisation Short Name	Cost model(s) used: For Transnational Access	Cost model(s) used: For any other activities	Eligible costs (in €)	Research and Technological Development / Innovation (A): Contractor	(A): AC Third party(ies)	(A): FC/FCF Third party(ies)	Demonstration (B): Contractor	(B): AC Third party(ies)	(B): FC/FCF Third party(ies)	Management of the consortium (C): Contractor	(C): AC Third party(ies)	(C): FC/FCF Third party(ies)	Other Specific Activities: Coordination (D): Contractor	(D): AC Third party(ies)	(D): FC/FCF Third party(ies)	Other Specific Activities: Transnational Access (E): Contractor	(E): AC Third party(ies)	(E): UF Third party(ies)	Other Specific Activities (F): Contractor	(F): AC Third party(ies)	(F): FC/FCF Third party(ies)	Total eligible costs (G)=(A)+(B)+(C)+(D)+(E)+(F): Contractor	(G): AC Third party(ies)	(G): FC/FCF Third party(ies)	Receipts: Contractor	Receipts: AC Third party(ies)	Receipts: FC/FCF Third party(ies)
					Type of activities																							
1	RU	UF	AC	Direct eligible costs	196,232.83						163,025.56			145,810.72			883,125.00			107,945.72			1,496,139.83	0.00	0.00	29,403.11		
				of which direct eligible costs of subcontracting	0.00						0.00			0.00			0.00			0.00			*0.00*	*0.00*	*0.00*			
				Indirect eligible costs	39,246.57						18,273.58			17,676.75			176,625.00			21,589.15			273,411.05	0.00	0.00			
				Adjustment on previous period(s)	-2,684.30						-2,951.96			-3,277.44			0.00			0.00			-8,913.70	0.00	0.00			
				Total eligible costs	232,795.10	0.00	0.00	0.00	0.00	0.00	178,347.18	0.00	0.00	160,210.03	0.00	0.00	1,059,750.00	0.00	0.00	129,534.87	0.00	0.00	1,760,637.18	0.00	0.00			
2	HAIT	-	AC	Direct eligible costs							1,000.00			14,339.00									15,339.00	0.00	0.00			
				of which direct eligible costs of subcontracting							0.00			0.00									*0.00*	*0.00*	*0.00*			
				Indirect eligible costs							0.00			2,867.80									2,867.80	0.00	0.00			
				Adjustment on previous period(s)							0.00			0.00									0.00	0.00	0.00			
				Total eligible costs	0.00	0.00	0.00	0.00	0.00	0.00	1,000.00	0.00	0.00	17,206.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18,206.80	0.00	0.00			
3	CNRS	UF	FCF	Direct eligible costs	431,134.33		71,818.75				22,034.37			69,418.81			453,096.50			42,652.64			1,018,336.65	0.00	71,818.75			
				of which direct eligible costs of subcontracting	0.00		0.00				0.00			0.00			0.00			0.00			*0.00*	*0.00*	*0.00*			
				Indirect eligible costs	86,226.85		14,363.75				4,406.87			13,883.76			90,619.30			8,530.53			203,667.31	0.00	14,363.75			
				Adjustment on previous period(s)	0.00		0.00				0.00			0.00			0.00			0.00			0.00	0.00	0.00			
				Total eligible costs	517,361.18	0.00	86,182.50	0.00	0.00	0.00	26,441.24	0.00	0.00	83,302.57	0.00	0.00	543,715.80	0.00	0.00	51,183.17	0.00	0.00	1,222,003.96	0.00	86,182.50			
4	IFW-DD	UF	AC	Direct eligible costs	64,696.26						400.00						58,596.65			10,197.48			133,890.39	0.00	0.00			
				of which direct eligible costs of subcontracting	0.00						0.00						0.00			0.00			*0.00*	*0.00*	*0.00*			
				Indirect eligible costs	12,939.25						0.00						11,719.34			2,039.48			26,698.07	0.00	0.00			
				Adjustment on previous period(s)	0.00						0.00						0.00			0.00			0.00	0.00	0.00			
				Total eligible costs	77,635.51	0.00	0.00	0.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	70,315.99	0.00	0.00	12,236.96	0.00	0.00	160,588.46	0.00	0.00			
5	NICPB	-	AC	Direct eligible costs	93,880.05						2,200.00												96,080.05	0.00	0.00			
				of which direct eligible costs of subcontracting	0.00						0.00												*0.00*	*0.00*	*0.00*			
				Indirect eligible costs	18,776.00						0.00												18,776.00	0.00	0.00			
				Adjustment on previous period(s)	681.63						0.00												681.63	0.00	0.00			
				Total eligible costs	113,337.68	0.00	0.00	0.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	115,537.68	0.00	0.00			
6	FZR-IIM	-	FC	Direct eligible costs	230,194.43						950.00												231,144.43	0.00	0.00			
				of which direct eligible costs of subcontracting	0.00						0.00												*0.00*	*0.00*	*0.00*			
				Indirect eligible costs	310,762.47						0.00												310,762.47	0.00	0.00			
				Adjustment on previous period(s)	0.00						0.00												0.00	0.00	0.00			
				Total eligible costs	540,956.90	0.00	0.00	0.00	0.00	0.00	950.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	541,906.90	0.00	0.00			
7	KUL-R&D	UF	AC	Direct eligible costs	82,498.94						2,000.00						44,514.54			5,942.12			134,955.60	0.00	0.00			
				of which direct eligible costs of subcontracting	0.00						0.00						0.00			0.00			*0.00*	*0.00*	*0.00*			
				Indirect eligible costs	16,499.78						0.00						8,902.92			1,119.93			26,522.63	0.00	0.00			
				Adjustment on previous period(s)	-2,073.98						0.00						0.00			0.00			-2,073.98	0.00	0.00			
				Total eligible costs	96,924.74	0.00	0.00	0.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	53,417.46	0.00	0.00	7,062.05	0.00	0.00	159,404.25	0.00	0.00			
8	UOXF.DK	-	AC	Direct eligible costs	127,232.49						2,094.25												129,326.74	0.00	0.00			
				of which direct eligible costs of subcontracting	0.00						0.00												*0.00*	*0.00*	*0.00*			
				Indirect eligible costs	25,446.45						0.00												25,446.45	0.00	0.00			
				Adjustment on previous period(s)	0.00						0.00												0.00	0.00	0.00			
				Total eligible costs	152,678.94	0.00	0.00	0.00	0.00	0.00	2,094.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	154,773.19	0.00	0.00			
9	UBER	UF	AC	Direct eligible costs							850.00						15,067.50			3,673.96			19,591.46	0.00	0.00			
				of which direct eligible costs of subcontracting							0.00						0.00			0.00			*0.00*	*0.00*	*0.00*			
				Indirect eligible costs							0.00						3,013.50			734.80			3,748.30	0.00	0.00			
				Adjustment on previous period(s)							0.00						0.00			0.00			0.00	0.00	0.00			
				Total eligible costs	0.00	0.00	0.00	0.00	0.00	0.00	850.00	0.00	0.00	0.00	0.00	0.00	18,081.00	0.00	0.00	4,408.76	0.00	0.00	23,339.76	0.00	0.00			
10	ICMA	UF	AC	Direct eligible costs							550.00						5,950.00			6,011.00			12,511.00	0.00	0.00			
				of which direct eligible costs of subcontracting							0.00						0.00			0.00			*0.00*	*0.00*	*0.00*			
				Indirect eligible costs							0.00						1,190.00			1,202.20			2,392.20	0.00	0.00			
				Adjustment on previous period(s)							0.00						7,140.00			0.00			7,140.00	0.00	0.00			
				Total eligible costs	0.00	0.00	0.00	0.00	0.00	0.00	550.00	0.00	0.00	0.00	0.00	0.00	14,280.00	0.00	0.00	7,213.20	0.00	0.00	22,043.20	0.00	0.00			
Total eligible costs					1,731,690.05	0.00	86,182.50	0.00	0.00	0.00	214,832.67	0.00	0.00	260,719.40	0.00	0.00	1,759,560.25	0.00	0.00	211,639.01	0.00	0.00	4,178,441.38	0.00	86,182.50	29,403.11	0.00	0.00
							1,817,872.55			0.00			214,832.67			260,719.40			1,759,560.25			211,639.01		4,264,623.88			29,403.11
Requested EC contribution for the reporting period (in €) without taking into account receipts					1,202,531.01	0.00	43,091.25	0.00	0.00	0.00	214,832.67	0.00	0.00	260,719.40	0.00	0.00	1,759,560.25	0.00	0.00	211,639.01	0.00	0.00	3,692,373.59					
							1,245,622.26			0.00			214,832.67			260,719.40			1,759,560.25			211,639.01					

Requested EC contribution for the reporting period (in €) taking into account receipts [=Periodic Invoice]	3,692,373.59
Amount of the financial interests generated by the prefinancing	

Personnel effort for the whole duration of the project

Activities		RU AC		HAIT AC		CNRS FCF		IFW-DD AC		NICPB AC		FZR-IIM FC		KUL-R&D AC		UOXF.DK AC		UBER AC		ICMA AC		Total	
		total	*charged*	*total*	*charged*	*total*	*charged*	*total*	*charged*	*total*	*charged*	*total*	*charged*	*total*	*charged*	*total*	*charged*	*total*	*charged*	*total*	*charged*	*total*	*charged*
M: Consortium management activity	*actual*	**32.0**	**13.0**			**2.5**	**2.5**															**34.5**	**15.5**
	planned	**24.0**	**12.0**																			**24.0**	**12.0**
N1: Secondments, workshops, school	*actual*	**3.0**	**0.0**	**10.0**	**7.0**	**6.0**	**0.0**			**3.0**	**0.0**	**3.0**	**0.0**									**25.0**	**7.0**
	planned																					**0.0**	**0.0**
T1	*actual*	**UF**	**0.0**																			**UF**	**0.0**
	planned	**0.0**	**0.0**																			**0.0**	**0.0**
T2	*actual*	**UF**	**0.0**			**UF**	**0.0**							**UF**	**0.0**			**UF**	**0.0**	**UF**	**0.0**	**UF**	**0.0**
	planned	**0.0**	**0.0**			**0.0**	**0.0**							**0.0**	**0.0**			**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
T3	*actual*							**UF**	**0.0**													**UF**	**0.0**
	planned							**0.0**	**0.0**													**0.0**	**0.0**
JRA NMR	*actual*	**71.5**	**38.0**			**49.7**	**28.0**	**24.0**	**15.0**	**46.0**	**35.8**											**191.2**	**116.8**
	planned	**48.0**	**48.0**			**36.0**	**36.0**	**15.0**	**15.0**	**36.0**	**36.0**											**135.0**	**135.0**
JRA IR	*actual*					**30.5**	**9.0**					**80.0**	**41.0**	**40.5**	**31.5**	**40.0**	**24.0**					**191.0**	**105.5**
	planned					**50.0**	**15.0**					**60.0**	**36.0**	**30.0**		**40.0**	**24.0**					**180.0**	**75.0**
Total	*actual*	**106.5**	**51.0**	**10.0**	**7.0**	**88.7**	**39.5**	**24.0**	**15.0**	**49.0**	**35.8**	**83.0**	**41.0**	**40.5**	**31.5**	**40.0**	**24.0**	**0.0**	**0.0**	**0.0**	**0.0**	**441.7**	**244.8**
	planned	**72.0**	**60.0**	**0.0**	**0.0**	**86.0**	**51.0**	**15.0**	**15.0**	**36.0**	**36.0**	**60.0**	**36.0**	**30.0**	**0.0**	**40.0**	**24.0**	**0.0**	**0.0**	**0.0**	**0.0**	**339.0**	**222.0**

The *actual* effort in the first row of each activity should summarize the human effort devoted by the partner to the activity along the entire duration of the project

The *planned* effort in the second row of each activity should correspond to what indicated in Annex I (DoW) to the Contract

AC contractors must include in the column "*total*" the total human effort (including permanent staff) and, in the column "*charged*", usually the additional staff only.

For FC- FCF contractors the two columns ("*total*" and "*charged*") should usually indicate the same effort

For Transnational Access, the total effort (and in the second column the effort that will be charged to the contract), will exclude the effort charged under the User Fee if UF cost model is used

C. FINAL REPORT ON THE DISTRIBUTION OF THE COMMUNITY FINANCIAL CONTRIBUTION

The coordinator will submit within 60 days after receipt of the final payment by the Commission a Final report on the distribution of the Community's contribution reporting the final, cumulative distribution of funds made to each contractor. The report shows the net payment made to each contractor over the entire duration of the project. This report must be submitted as separate document in the format given in ***Appendix 6****]*

Report on the Distribution of the Community's contribution

Type of Instrument	I3	Project Title (or Acronym)	EuroMagNET		506239

Part I — Community's prefinancing (or payment) sent to the coordinator (1)

	Reporting Period 1 (2) From 1/01/2005	Reporting Period 1 (2) To 31/12/2005	Reporting Period 2 (2) From 1/01/2006	Reporting Period 2 (2) To 31/12/2006	Reporting Period 3 (2) From 1/01/2007	Reporting Period 3 (2) To 31/12/2007	Reporting Period 4 (2) From 1/01/2008	Reporting Period 4 (2) To 31/12/2008	Final payment		Total Amount (I) (3)
	Date	Amount (A)	Date	Amount (B)	Date	Amount (C)	Date	Amount (D)	Date	Amount (H)	
Total (X)	20/12/2004	1,096,000.00	22/08/2006	883,597.62	6/07/2007	915,106.73	28/05/2008	375,352.90			3,270,057.25

Part II — Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) (4)

Contractor n°	Organisation Short Name	Country Code	Reporting Period 1 Date(s) (5)	Reporting Period 1 Amount(s) (A') (5)	Reporting Period 2 Date(s) (5)	Reporting Period 2 Amount(s) (B') (5)	Reporting Period 3 Date(s) (5)	Reporting Period 3 Amount(s) (C') (5)	Reporting Period 4 Date(s) (5)	Reporting Period 4 Amount(s) (D') (5)	Final payment Date(s) (5)	Final payment Amount(s) (H') (5)	Total Amount (I') (6)
1	RU	NL	18/01/2005	434,789.92	22/08/2006	415,871.95	6/07/2007	445,173.56					1,295,835.43
													0.00
													0.00
													0.00
			Total	434,789.92	Total	415,871.95	Total	445,173.56	Total	0.00	Total	0.00	1,295,835.43
2	HAIT	IL	26/01/2005	19,151.63			31/12/2007	-945.00					18,206.63
													0.00
													0.00
													0.00
			Total	19,151.63	Total	0.00	Total	-945.00	Total	0.00	Total	0.00	18,206.63
3	CNRS	FR	26/01/2005	190,877.93	5/04/2006	95,438.96	19/02/2007	65,068.48	7/07/2008	83,414.74			434,800.11
					15/09/2006	132,108.74	19/07/2007	169,357.19	17/07/2008	81,867.16			383,333.09
					12/10/2006	75,000.00							75,000.00
													0.00
			Total	190,877.93	Total	302,547.70	Total	234,425.67	Total	165,281.90	Total	0.00	893,133.20
4	IFW-DD	DE	19/01/2005	76,446.93	5/04/2006	38,223.46	21/08/2007	30,298.61	17/07/2008	14,941.70			159,910.70
					15/09/2006	5,832.92							5,832.92
													0.00
													0.00
			Total	76,446.93	Total	44,056.38	Total	30,298.61	Total	14,941.70	Total	0.00	165,743.62
5	NICPB	EE	19/01/2005	31,919.39	5/04/2006	15,959.69	19/02/2007	8,526.64	17/07/2008	4,433.08			60,838.80
					15/09/2006	17,311.67	19/07/2007	16,349.22					33,660.89
													0.00
													0.00
			Total	31,919.39	Total	33,271.36	Total	24,875.86	Total	4,433.08	Total	0.00	94,499.69
6	FZR-IIM	DE	19/01/2005	44,367.95	5/04/2006	22,183.97	19/02/2007	18,749.45	17/07/2008	71,910.45			157,211.82
					15/09/2006	38,067.06	19/07/2007	47,559.06					85,626.12
													0.00
													0.00
			Total	44,367.95	Total	60,251.03	Total	66,308.51	Total	71,910.45	Total	0.00	242,837.94
7	KUL - R & D	BE	28/01/2005	33,579.19	5/04/2006	16,789.60	19/02/2007	14,608.46	17/07/2008	32,273.38			97,250.63
					15/09/2006	29,659.59	16/07/2007	26,820.37					56,479.96
													0.00
													0.00
			Total	33,579.19	Total	46,449.19	Total	41,428.83	Total	32,273.38	Total	0.00	153,730.59
8	UOXF.DK	UK	19/01/2005	35,430.52	5/04/2006	17,715.26	19/02/2007	6,954.49	17/07/2008	23,510.61			83,610.88
					15/09/2006	14,119.73	16/07/2007	47,295.14					61,414.87
													0.00
													0.00
			Total	35,430.52	Total	31,834.99	Total	54,249.63	Total	23,510.61	Total	0.00	145,025.75
9	UBER	DE	26/01/2005	5,202.86	5/04/2006	2,601.43	19/07/2007	3,514.28	17/07/2008	850.96			12,169.53
					15/09/2006	11,170.23							11,170.23
													0.00
													0.00
			Total	5,202.86	Total	13,771.66	Total	3,514.28	Total	850.96	Total	0.00	23,339.76
10	ICMA	ES	26/01/2005	3,830.33	5/04/2006	1,915.16		0.00	17/07/2008	10,132.45			15,877.94
					18/09/2006	1,934.51							1,934.51
													0.00
													0.00
			Total	3,830.33	Total	3,849.67	Total	0.00	Total	10,132.45	Total	0.00	17,812.45
Total (Y)			Total	875,596.65	Total	951,903.93	Total	899,329.95	Total	323,334.53	Total	0.00	3,050,165.06

Part III — Difference between Community's prefinancing (or payment) sent to the coordinator and Total Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) (4)

	Reporting Period 1	Reporting Period 2	Reporting Period 3	Reporting Period 4	Final payment	Total Amount
Community's prefinancing (or payment) not yet distributed between contractors (Z) (7)	220,403.35	-68,306.31	15,776.78	52,018.37	0.00	219,892.19

I certify that the information set out in this(these) form(s) is accurate and correct and agreed by all contractors.

Name (8)	Surname (8)	Date (dd/mm/yyyy)	
Jan	Kuijpers	5/03/2008	

Explanatory notes

(1): To be filled in only by the Commission services.
(2): Established in conformity with articles 4.2 and 6 of the contract.
(3): (I) = (A) + (B) + (C) + (D) + (E) + (F) + (G) + (H)
(4): To be filled in only by the coordinator.
(5): Insert the dates (dd/mm/yyyy) and the amounts (x,xxx.xx €) transferred to a contractor (including the coordinator) for a reporting period. If there are more than one transfer to a contractor during a reporting period, identify each date and each relating transferred amount.
(6): (I') = (A') + (B') + (C') + (D') + (E') + (F') + (G') + (H')
(7): (Z) = (X) - (Y)
(8): One the following persons : authorised contact person or first or second administrative official authorised to sign the contract, as mentioned in your Contract Preparation Form (Form A2b)

D. QUESTIONNAIRES

At the end of your project, the following reporting questionnaires need to be completed and submitted with the final report. They should cover the entire project duration.:

D.1 Final science and society reporting questionnaire

The questionnaire has been designed to monitor how Science and Society has been embedded in the project. It is completed on-line by the co-ordinator only (Appendix 1 contains a paper version of the questionnaire for easy reference).

D.2 Final reporting questionnaire on workforce statistics

This questionnaire has been designed to collect gender statistics on the project workforces. It is completed on-line by each contractor (Appendix 2 contains a paper version of the questionnaire for easy reference).

D.3 Final socio-economic reporting questionnaire

The purpose of this questionnaire is to get data on the integration of the socio-economic (and foresight) aspects of the research in the project. It is completed on-line by each contractor (Appendix 3 contains a paper version of the questionnaire for easy reference).

All reporting questionnaires should be completed on-line using the SESAM tool available on http://webgate.ec.europa.eu/sesam. In this respect, all project co-ordinators and partners have to register with the system to get a login/password combination by email for accessing this tool. For any technical problems with the SESAM tool, contact the helpdesk (email: ec-fp6-it-helpdesk@ec.europa.eu).

Appendix 1 – Science and society reporting questionnaire

Science and Society Reporting Questionnaire

Introduction

FP6 was designed to focus, integrate, structure and strengthen the European Research Area (ERA). The influence of science and technology on society was acknowledged when the ERA was established and the importance of having a healthy dialogue between science and society was recognised. This area now forms part of the policy to structure the ERA under the heading Science and Society. It incorporates ethical, gender and communications issues together with issues affecting education and youth and governance.

This questionnaire has been compiled for FP6 Project Coordinators. It has been designed to help coordinators respond to contractual reporting requirements (Article II.10.3 of the contract states that consortia must engage with actors beyond the research community) and to facilitate the monitoring of the science and society dimension in FP6.

The information gathered through this exercise will be confidential and will not be disclosed to any third parties or used in any way that could be linked to individual projects.

Please complete the questionnaire by ticking boxes or filling out information where requested. It would be appreciated if as many questions as possible could be completed.

Please note that Part A will be completed automatically when the contract number is entered.

A General Information on Contractor

1	**Contract Number:**	RII3-CT-2004-506239
2	**Instrument:**	Integrated Infrastructure Initiative
3	**Thematic Priority:**	Infrastructures
4	**Title of Project:**	A coordinated approach to access, experimental development and scientific exploitation of European large infrastructure for high magnetic fields
5	**Name and Title of Coordinator:**	Prof. Jan Cornelis Maan
6	**Period Covered, Start Date:**	01/01/05 **End Date:** 31/12/08
7	**EC Contribution to project:**	€ 3 680 000

B Ethics

8 Which (if any) of the following does your research project involve?

- ❑ Human beings
- ❑ Human biological samples
- ❑ Personal data
- ❑ Genetic information
- ❑ Animals
- ❑ Human embryos or human embryonic stem cells
- ❑ Non human primates and other animals
- ☑ None of the above

9 To what extent do you believe ethical issues are relevant to your research project?

- ✓ Not relevant
- ○ Minor relevance
- ○ Significant relevance
- ○ Critical

10 Do you have Ethicists or others with considerable ethics experience involved in the project?

- ○ Yes
- ✓ No

11 Did your project have a separate EC ethical review?

- ○ Yes
- ✓ No

12 How much (including the value of time spent, as well as paid-out costs) do you estimate your project (when it is completed) will have spent on considering and dealing with ethical issues?

€ 0

C Gender

13a Did you undertake Gender Equality Actions in your research project?

- ○ Yes
- ✓ No

13b If no, why not?

- ✓ Not relevant
- ○ Team not gender aware
- ○ No budget
- ○ Not supported (no will)
- ○ Other:

13c If yes, which of the following actions did you carry out and how effective were they?

	Not at all effective				Very effective
❑ Design and implement an equal opportunity policy	○	○	○	○	○
❑ Implement mentoring schemes for women	○	○	○	○	○
❑ Family friendly working conditions	○	○	○	○	○

14 Was there a gender dimension associated with the research content?

- ○ Yes. If yes, please specify
- ✓ No

15 How much (including the value of time spent, as well as paid-out costs) do you estimate your project (when it is completed) will have spent on considering and dealing with gender issues?

€ 0

D Science Education, Training and Career Development

16a Does this project anticipate having a direct impact on the local economy?

- ✓ Yes
- ○ No

16b If Yes, is the project:

- ☑ Stimulating employment
- ☑ Retaining highly trained personnel
- ❑ Creating possible spin-out/start-up companies

17 Does your partnership employ and train researchers?

- ✓ Yes
- ○ No

18 Does your project involve working with young people at schools?

- ○ Yes
- ✓ No

19 Is there any education material being produced directly or indirectly by your project?

- ✓ Yes
- ○ No

20 How much (including the value of time spent, as well as paid-out costs) do you estimate your project (when it is completed) will have spent on considering and dealing with Science Education, Training and Career Development issues? 100k€

E Engaging With Actors Beyond the Research Community

20a Is the project likely to generate outputs (expertise or scientific advice) which could be used by policy makers?

- ○ Yes
- ✓ No

20b If Yes, is this a primary or secondary objective of the project?

- ○ Primary
- ○ Secondary

21a Did your project engage in significant communication with the public before research commenced?

- ✓ Yes
- ○ No

21b Was the focus or methodology of your project modified in response to any communication with the public?

- ○ Yes
- ✓ No

22 Does your project involve someone whose role is solely to communicate with the public?

- ○ Yes
- ✓ No

F Use and dissemination

23 How many articles were published ?

In refereed journals: >80 Other journals:

24 How many patents have been applied for ?

0

25 How many other Intellectual Property Rights were applied for?

0

26 How many spin-offs were created? 0

27 Have you issued press releases related to your project (and if so, how many)?

✓ Yes, number: 5

○ No

28 Have you held media briefings? If so, how many, and on average roughly how many journalists attended?

○ Yes, number of briefings: average number of journalists:

✓ No

29a Roughly how many items covering your project in the printed press, on radio or television can you identify?

Press: 18 Radio: 3 Television: 6

29b Roughly how many items were:

Specialist Press: 0 Non-specialist Press: 27

National Press: 22 International Press: 5

30a Was there on-line information about the project?

- ○ Yes
- ✓ Specific web site
- ○ No

30b Roughly how frequently has it been updated?

Each 2 months

31 Do you have an e-mail mailing list to send news about the project? If so, how many subscribers to the list are there?

- ✓ Yes, number of subscribers: 700
- ○ No

32a Have you created or participated in an event (e.g. workshop, conference, information day) in order to communicate with the public (not just other researchers or the press)?

- ✓ Yes public lectures, open days and site tours, teaching at schools
- ○ No

32b Roughly how many people attended these events and learned about your project?

4000

33a Have you produced a video or DVD film about your project?

- ○ Yes
- ✓ No

33b If so, how effective do you believe it has been in communicating with the public?

- ○ Unable to assess
- ○ Completely ineffective
- ○ Mostly ineffective
- ○ Partially effective
- ○ Significantly effective
- ○ Extremely effective

34a Have you produced posters, flyers or brochures about your project?

- ✓ Yes
- ○ No

34b If so, how effective do you believe they have been in communicating with the public?

- ○ Unable to assess
- ○ Completely ineffective
- ○ Mostly ineffective
- ✓ Partially effective
- ○ Significantly effective
- ○ Extremely effective

35 In how many different languages were these products (video/DVD, posters, flyers, brochures) produced?

1: english

36 How have you distributed these products (video/DVD, posters, flyers, brochures)? Please tick all methods you have used.

- ☑ Sent on request
- ☑ Sent to schools/academic institutions
- ☐ Distributed through government agencies/public buildings/libraries etc.
- ☐ Sent to potentially interested non-governmental bodies (NGOs, citizen's associations etc)
- ☑ Other: Distributed at conferences

G Total Communication Spend

37 How much (including the value of time spent, as well as paid-out costs) do you estimate your project (when it is completed) will have spent on communication activities (engaging with the public, use and dissemination) as described in the current questionnaire?

€ 200 000

H Comments

38 If you have any comments about your experience of meeting the Science and Society objectives within your project, or any suggestions of improvements to the programme please add them here:

Thank you for your help!

Appendix 2 – final reporting questionnaires on workforce statistics

WORK FORCE STATISTICS
FINAL REPORT

This report is part of the final reporting to be completed by the contractors of all projects at the end of the project.

1. GENERAL INFORMATION

1.1. Contract No.: RII3-CT-2004-506239

1.2. Thematic priority: Infrastructures

1.3. Instrument type: Integrated Infrastructure Initiative

1.4. Project acronym: EuroMagNET

1.5. Period covered (Start Date – End Date)[1]: 01/01/2005 31/12/2008

1.6. Name and title of co-ordinator[1]: Prof. Jan Cornelis Maan

1.7. Name and title of contractor: RU-HFML

2. SCIENTIFIC LEADERSHIP AND MANAGEMENT, AND WORKFORCE STATISTICS FOR THE PROJECT TO BE COMPLETED BY CONTRACTORS

Please complete the table below on a Headcount basis (Previously supplied data will be inserted automatically)

Type of Position	Number of Women	Number of Men	Total	% Women	% Men
Scientific manager	0	1	1	0	100
Scientific team leader / work package manager	0	2	2	0	100
Experienced researcher (> 4 years)	0	4	4	0	100
Early researcher (<= 4 years)	1	1	2	50	50
PhD students	2	6	8	25	75
Technical staff	0	6	6	0	100
Other	1	0	1	100	0

WORK FORCE STATISTICS
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1. GENERAL INFORMATION

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1.4. Project acronym: EuroMagNET

1.5. Period covered (Start Date – End Date)[1]: 01/01/2005 31/12/2008

1.6. Name and title of co-ordinator[1]: Prof. Jan Cornelis Maan (RU)

1.7. Name and title of contractor: CNRS-LNCMP, dr. Geert Rikken

2. SCIENTIFIC LEADERSHIP AND MANAGEMENT, AND WORKFORCE STATISTICS FOR THE PROJECT TO BE COMPLETED BY CONTRACTORS

Please complete the table below on a Headcount basis (Previously supplied data will be inserted automatically)

Type of Position	Number of Women	Number of Men	Total	% Women	% Men
Scientific manager	0	1	1	0	100
Scientific team leader / work package manager	1	4	5	20	80
Experienced researcher (> 4 years)	0	4	4	0	100
Early researcher (<= 4 years)	1	3	4	25	75
PhD students	2	4	6	33	67
Technical staff	3	17	20	15	85
Other	0	0		0	0

Appendix 3 – Socio-economic reporting questionnaire

SOCIO-ECONOMIC REPORTING QUESTIONNAIRE

(To be completed by each contractor in the project)

INTRODUCTION

In the process of building the European Research Area, democratic governance must ensure that social and economic issues are taken into consideration in the research activities and that citizens are informed about and aware of the social aspects with regard to scientific and technological progress. In this context, it is also acknowledged that the benefits of research in support of socio-economic policy challenges would be enhanced by an appropriate integration of socio-economic research dimensions.

The importance of the integration of socio-economic aspects in research was recognised in FP6 and should be duly taken into consideration by contractors where relevant for the actions concerned in horizontal and thematic activities of FP6.

This questionnaire applies to all projects and must be filled in by each contractor in the project. It is designed to facilitate the monitoring of the integration of the socio-economic dimensions in FP6 and to finally support the assessment of the research that will guide the future policy formulations and decisions.

The submission of this questionnaire will be done on-line.

The information gathered through this exercise will be kept confidential and will not be disclosed to any third parties or used in any way that could be linked to individual projects.

QUESTIONS

1.1 Do your tasks in the project include socio-economic research activities[1] ? No

1.2 If "Yes", what is the estimated total budget allocation that addresses these activities ? *(Cost in Euro or N/A)*

2.1 Do your tasks in the project include foresight methods[2] ? No

[1] - Ex-ante or ex-post assessments (or contribution to such analysis e.g. cost-benefit/cost-effectiveness studies, etc…) of the expected impact of the knowledge and/or technology generated from the research (project, programme or framework programme), as well as analysis of the factors that would influence their exploitation (e.g. statistical indicators, standardisation, ethical and regulatory aspects, impact on consumers and markets, public awareness/acceptance and understanding of science, political/societal and/or economic implications, etc…)
- Any type of models or tools to support the assessment of impact on society, economy and businesses resulting from the deployment of new services or technologies.
- Any research seeking both a better integration of Science in Society and Society in Science.
- Any type of research aiming at understanding the societal and economic phenomena (research in social sciences and humanities)
- Actions e.g. assessments, tools & methods, comparative research, etc to support the formulation and implementation of Community policies.
- Any type of activity involving scientist(s) with a specific background in social, political sciences or in economy (discipline approach).

2.2	**If "Yes", what is the estimated total budget allocation that addresses these activities?**	N/A
3.	**How many person/months (estimated) are allocated to researchers with a background in social sciences[3], to perform your tasks for the project ?**	*0*

[2] Any type of foresight, i.e. participative vision-building approaches, future studies and forward looking activities, including scenarios of the evolution of Europe's potential in a related field, forecasting, prospective studies, forward looks, etc.

[3] Domains of academic disciplines covered by the social sciences are: Psychology, Economics, Education sciences, Anthropology (social and cultural) and ethnology, Demography, Geography (human, economic and social), Town and country planning, Management, Law, Linguistics, Political sciences, Sociology, Organisation and methods, Miscellaneous social sciences and interdisciplinary.