

NEW TRENDS IN QUANTUM MAGNETISM



LPS Orsay 1-3 June 2010

Tuesday, June 1st	Wednesday, June 2nd	Thursday, June 3rd
	9:00 1D and quasi-1D Coffe/Tea	8:45! Frustration and Coffe/Tea
	Systems	spin liquids
Arrival	13:00 Lunch restaurant 100% nature	13:00 Lunch
14:00 Registration & Coffee	15:00	14:00
14:45 Field-Induced Coffe/Tea	Impurities Coffe/Tea	New Paradigms Coffe/Tea
Phenomena	and disorder	and Models
19:00 POSTER + BUFFET	18:30 Free evening	17:30 Departure

- Invited Speakers***
- I. Affleck (UBC)
 - F. Alet (LPT Toulouse)
 - F. Bert (LPS Orsay)
 - C. Berthier (LNCMI Grenoble)
 - J. Bobroff (LPS Orsay)
 - P. Calabrese (Pisa)
 - R. Coldea (Oxford)
 - F. Mila (EPFL)
 - A. Ralko (Néel Grenoble)
 - C. Rüegg (UC London)
 - M. Schechter (Ben Gurion Univ.)
 - F. Zamponi (ENS Paris)

Scientific committee

- M. Horvatic
- W. Knafo
- N. Laflorencie
- C. Lhuillier
- P. Mendels
- G. Misguich
- D. Poilblanc
- P. Pujol



FINAL REPORT

During this 3 day workshop in Laboratoire de Physique des Solides (Orsay), more than 80 people involved in the field of Quantum Magnetism (both theoreticians and experimentalists) have met. The atmosphere was very nice and intellectually stimulating. The program was very intense, with 5 major topics covered, 12 invited talks of 30 minutes, 32 contributed talks of 20 minutes and 18 posters presented during a poster + buffet session at night. The five sessions focused on **1) Field-Induced Phenomena** (chairs: Leon Balents and Stefan Wessel) ; **2) 1D and quasi-1D Systems** (chairs: Sebastian Eggert and Didier Poilblanc) ; **3) Impurities, Disorder and Diluted Systems** (chairs: Avinash Mahajan and Nicolas Laflorencie) ; **4) Frustrated Systems, Spin Liquids** (chairs: Philippe Mendels and Claire Lhuillier) ; **5) New Paradigms for Quantum Spin Models** (chairs: Ian Affleck and Grégoire Misguich) have all gathered many worldwide recognized expert in the field.

Among the 83 participants (11 women and 72 men), several countries were represented: 42 people were coming from french institutions (CNRS, Universities, CEA), 33 from Europe (Germany, Italy, UK, Switzerland, Poland, Slovenia, Slovakia, Estonia, Israel), 4 from North America (Canada and USA) and 4 from Asia (Japan and India). Many young researchers were present and most of them have been very active: 10 PhD students and 19 postdocs attended to the meeting and among them, 11 gave an oral presentation and 11 presented a poster.

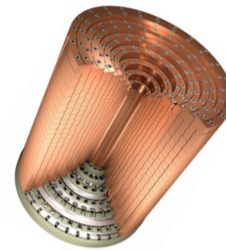
Quantum Magnetism is nowadays a very active field where experimentalists and theoreticians work in close collaboration. During this workshop, we had another demonstration of such a synergy. Many ground breaking concepts such as quantum criticality, frustration and spin liquids, quantum entanglement have been discussed in the context of magnetic models and real materials. Realistic situations where impurities and disorder are intrinsically present, as well as other kinds of perturbations (magnetic anisotropies for instance) have also been presented and debated. State of the art techniques, such as neutron scattering or high-field NMR, as well as numerical methods such as the Density Matrix Renormalization Group or Quantum Monte Carlo methods have been intensively discussed since they are now used everyday to improve our understanding of puzzling quantum phenomena at play in quantum magnets.

In the next future, several colleagues have already mentionned that they would benefit a lot from making this event periodic, say every two years. We are now discussing to organize the next issue in 2012 in Switzerland.

PROGRAM

14:00 **Registration desk opening**

FIELD INDUCED PHENOMENA
TUESDAY JUNE 1st, 14:45 - 19:00



14:45 **Welcome**

Chair: Leon Balents

15:00 **Radu COLDEA** (Oxford)

QUANTUM CRITICALITY IN WEAKLY-COUPLED ISING CHAINS IN TRANSVERSE FIELD (invited)

15:30 **Nikolay TSYRULIN** (LQM EPFL)

MAGNETISM IN $S = 1$ QUASI-ONE-DIMENSIONAL ANTIFERROMAGNET DTN

15:50 **Corinna KOLLATH** (CPHT Polytechnique)

PROPERTIES OF WEAKLY COUPLED SPIN 1/2 LADDER COMPOUNDS

16:10 **Claude BERTHIER** (LNCMI Grenoble)

HIGH FIELD NMR IN QUANTUM SPIN SYSTEMS : BOSE-EINSTEIN CONDENSATION VS WIGNER CRYSTALLIZATION (invited)

16:40 **Salvatore MANMANA** (ITP EPFL)

UNCONVENTIONAL MAGNETIZATION PLATEAUS IN A SHASTRY-SUTHERLAND SPIN TUBE

17:00 **Raivo STERN** (NICPB Tallinn)

BOSE-EINSTEIN CONDENSATION IN OXIDE DIMER SYSTEMS INVESTIGATED BY NMR

17:20 **BREAK**

Chair: Stefan Wessel

17:40 **Frédéric MILA** (ITP EPFL)

EXPLORING THE PHYSICS OF LATTICE BOSONS WITH QUANTUM MAGNETS IN A FIELD (invited)

18:10 **Nic SHANNON** (Bristol)

SUPERSOLID PHASES IN A REALISTIC THREE-DIMENSIONAL SPIN MODEL

18:30 **Toru SAKAI** (University of Hyogo)

ANOMALOUS MAGNETIZATION PROCESS OF KAGOME-LATTICE ANTIFERROMAGNET

POSTER BUFFET
TUESDAY JUNE 1st, 19:00 - 22:00



1D AND QUASI-1D SYSTEMS
WEDNESDAY JUNE 2nd, 9:00 - 13:00



Chair: Sebastian Eggert

09:00 **Ian AFFLECK** (UBC)

DZYALOSHINSKI-MORIYA INTERACTIONS IN QUANTUM SPIN CHAINS (invited)

09:30 **Philippe LECHEMINANT** (LPTM Cergy)

HALDANE CHARGE CONJECTURE IN ONE-DIMENSIONAL MULTICOMPONENT FERMIONIC COLD ATOMS

09:50 **Daniel CHARRIER** (MPI Dresden)

QUANTUM PHASE TRANSITIONS IN A QUANTUM SPIN TUBE

10:10 **Marion MOLINER** (KIT Karlsruhe)

SR $\text{Cu}_2(\text{BO}_3)_2$ UNDER PRESSURE : ONE-DIMENSIONAL PHYSICS IN A TWO-DIMENSIONAL FRUSTRATED QUANTUM SPIN SYSTEM

10:30 **Jesko SIRKER** (Kaiserslautern)

DIFFUSION AND BALLISTIC TRANSPORT IN ONE-DIMENSIONAL QUANTUM SYSTEMS

10:50 BREAK

Chair: Didier Poilblanc

11:15 **Christian RÜEGG** (LCN London)

NEW DIRECTIONS IN SPIN LADDER PHYSICS (invited)

11:45 **Bella LAKE** (Helmutz Berlin)

NEUTRON SCATTERING FROM SPIN-LADDERS

12:05 **Emmanuel CANEVET** (ILL Grenoble)

STRONG INTERPLAY BETWEEN STRUCTURAL AND MAGNETIC PROPERTIES IN ORGANIC LOW DIMENSIONAL MAGNETIC SYSTEM F 5PNN

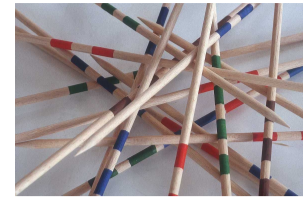
12:25 **Stefan-Ludwig DRECHSLER** (IFW Dresden)

INTERCHAIN AND INTRACHAIN INTERACTIONS IN STRONGLY FRUSTRATED CHAIN CUPRATES

12:45 LUNCH (Restaurant 100% nature)

IMPURITIES, DISORDER AND DILUTED SYSTEMS

WEDNESDAY JUNE 2nd, 15:00 - 18:30



Chair: Avinash Mahajan

15:00 **Julien BOBROFF** (LPS Orsay)

IMPURITY EFFECTS IN SPIN LADDERS AND OTHER LOW DIMENSION QUANTUM MAGNETS (invited)

15:30 **Ricardo Luís DORETTO** (ITP Cologne)

QUANTUM MAGNETS WITH WEAKLY CONFINED SPINONS : MULTIPLE LENGTH SCALES AND QUANTUM IMPURITIES

15:50 **Sebastian EGGERT** (Kaiserslautern)

IMPURITY EFFECTS IN A SUPERSOLID

16:10 **Francesco ZAMPONI** (ENS Paris)

AKLT MODELS WITH QUANTUM SPIN GLASS GROUND STATES (invited)

16:40 **Anuradha JAGANNATHAN** (LPS Orsay)

QUANTUM FLUCTUATIONS AROUND THE NÉEL STATE IN SYSTEMS WITH PHASON DISORDER

17:00 **Marcelo ROZENBERG** (LPS Orsay)

DISORDER EFFECTS IN THE QUANTUM KAGOME ANTIFERROMAGNET $\text{ZnCu}_3(\text{OH})_6\text{Cl}_2$

17:20 BREAK

Chair: Nicolas Laflorencie

17:45 **Moshe SCHECHTER** (Ben Gurion Univ.)

ARE DIPOLAR SPIN GLASSES AND ELECTRIC GLASSES ALIKE ? (invited)

18:15 **Bernard BARBARA** (Néel Grenoble)

DECOHERENCE IN "MOLECULE MAGNETS" AND "SPIN-ORBIT" QUBITS

FREE EVENING

FRUSTRATED SYSTEMS, SPIN LIQUIDS
THURSDAY JUNE 3rd, 08:45 - 13:15



Chair: Philippe Mendels

08:45 **Fabrice BERT** (LPS Orsay)

FRUSTRATED MAGNETISM IN THE QUANTUM KAGOME HERBERTSMITHITE $\text{ZnCu}_3(\text{OH})_6\text{Cl}_2$ ANTIFERROMAGNET (invited)

09:15 **Lars FRITZ** (ITP Cologne)

QUANTUM CRITICALITY IN KAGOME ANTIFERROMAGNETS WITH DZHALOSHINSKII-MORIYA INTERACTION

09:35 **Laura MESSIO** (LPTMC Paris)

PROJECTIVE SYMMETRY GROUP APPROACH OF CHIRAL PHASES

09:55 **Oleg JANSON** (MPI CPFS Dresden)

COUPLED FRUSTRATED QUANTUM SPIN- $\frac{1}{2}$ CHAINS WITH ORBITAL ORDER IN VOLBORTHITE $\text{Cu}_3\text{V}_2\text{O}_7(\text{OH})_2(\text{H}_2\text{O})_2$

10:15 **Arnaud RALKO** (Néel Grenoble)

EMERGENCE OF NON CONVENTIONAL VALENCE BOND PHASES IN FRUSTRATED SPIN-1/2 SYSTEMS (invited)

10:45 BREAK

Chair: Claire Lhuillier

11:00 **Sefan WESSEL** (ITP Stuttgart)

QUANTUM SPIN LIQUID IN THE HUBBARD MODEL ON THE HONEYCOMB LATTICE

11:20 **Federico BECCA** (SISSA Trieste)

SPIN-LIQUID AND MAGNETIC PHASES IN THE ANISOTROPIC TRIANGULAR LATTICE: THE CASE OF κ -(ET) $_2$ X

11:40 **Kai Phillip SCHMIDT** (Dortmund)

QUANTUM MAGNETISM OF THE HUBBARD MODEL ON THE TRIANGULAR LATTICE

12:00 **Martin BOEHM** (ILL Grenoble)

COEXISTENCE OF LONG-RANGE ORDERED AND LOCALIZED EXCITATIONS IN THE TRIANGULAR SYSTEM CuCrS_2

12:20 **Masanori KOHNO** (NIMS Tsukuba)

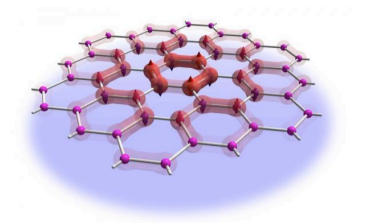
QUASIPARTICLES IN QUASI-ONE-DIMENSIONAL FRUSTRATED ANTIFERROMAGNETS IN A MAGNETIC FIELD

12:40 **Pierre DALMAS DE REOTIER** (CEA Grenoble)

LOW TEMPERATURE PROPERTIES OF GEOMETRICALLY FRUSTRATED MAGNETIC SYSTEMS ON A PYROCHLORE LATTICE

13:00 LUNCH (Buffet)

NEW PARADIGMS FOR QUANTUM SPIN MODELS
THURSDAY JUNE 3rd, 14:00 - 17:30



Chair: Ian Affleck

14:00 **Pasquale CALABRESE** (Pisa)

ENTANGLEMENT ENTROPY AND CONFORMAL FIELD THEORY (invited)

14:30 **Didier POILBLANC** (LPT Toulouse)

ENTANGLEMENT PROPERTIES OF QUANTUM SPIN LADDERS

14:50 **Fabien ALET** (LPT Toulouse)

VALENCE BONDS AND ENTANGLEMENT IN QUANTUM SPIN SYSTEMS (invited)

15:20 **Matthieu MAMBRINI** (LPT Toulouse)

FROM FRUSTRATED HEISENBERG ANTIFERROMAGNETS TO GENERALIZED QUANTUM DIMER MODELS : AN EXACT PROJECTION SCHEME

15:40 **Arnab SEN** (Boston Univ.)

PHASE TRANSITIONS IN SOME GENERALIZED "J-Q" TYPE MODELS IN TWO DIMENSIONS

16:00 **MINI-BREAK**

Chair: Grégoire Misguich

16:15 **Julien VIDAL** (LPTMC Paris)

THE TORIC CODE IN A MAGNETIC FIELD

16:35 **Fabricio ALBUQUERQUE** (LPT Toulouse)

QUANTUM CRITICAL SCALING OF FIDELITY SUSCEPTIBILITY

16:55 **Ludovic JAUBERT** (MPI Dresden)

SOME ASPECTS OF COULOMB PHASE PHYSICS

17:15 **Fabien TROUSSELET** (MPI Stuttgart)

QUANTUM MELTING OF VALENCE-BOND CRYSTALS ON THE PLANAR PYROCHLORE LATTICE : SUPERSOLID PHASE AT COMMENSURATE DENSITY

17:35 **END**