

HFM/ICTP School and Workshop on “Highly Frustrated Magnets and Strongly Correlated Systems: From Non-Perturbative Approaches to Experiments”

30 July – 17 August 2007, Trieste (Italy)

Organizers: F. Becca (Trieste), F. Essler (Oxford), F. Mila (Lausanne), S. Shastry (Santa Cruz), A. Tsvelik (Brookhaven)

Scientific report for the activity

The school and the workshop have been organized within the scientific program Highly Frustrated Magnetism (HFM), supported by the European Science Foundation (ESF) and the International Center for Theoretical Physics (ICTP) in Trieste. The final program resulted from merging two different proposals submitted to ICTP in December 2005: On one hand, there was a proposal for a school/workshop about highly frustrated materials; on the other hand, there was another proposal for a workshop on strongly correlated materials in one-dimensional systems. The resulting activity contained a school on frustrated materials (from July 30 to August 7) and a workshop containing both subjects (from August 8 to August 17).

The school was mainly addressed to graduate students and young researchers, covering the basic notions, as well as more advanced topics. In particular, there have been courses on basic theoretical concepts, methods, and experimental tools. The last part of the school has been devoted to advanced aspects, related to recent developments in the investigation of frustrated magnetic materials. All courses have been divided into two parts: the first one, usually in the morning, contained the main body of the course, in which the basic notions were introduced and discussed in detail; the second part, in the afternoon, was instead organized as a tutorial, with an active participation of the students. Students and young researchers had the opportunity to present their original work in a poster session.

The workshop covered different topics on both one-dimensional correlated systems and highly frustrated materials. In particular, the main subjects covered were: spin chains and ladder compounds, triangular systems, Kagome materials, spinels and pyrochlores, supersolids and bosonic models, magnetization plateaux, orbital degeneracy, nematic order, fundamental mechanisms and modeling, as well as other theoretical and experimental aspects.

The total activity had 201 participants, the school 24 lecturers, and the workshop 61 talks. The organizers tried to bring together a mix of very young students, postdocs and more senior researchers. The interdisciplinary approaches of the workshop, containing people working on different aspects of frustrated magnetism and strongly correlated models, led to fruitful and exciting exchanges on the various subjects considered during the activity. The organization of the scientific sessions was optimized in order to leave a substantial part of the time for free discussions. All the scientific activities took place in the main hall of ICTP.

The webpage of the workshop was updated constantly at:

http://cdsagenda5.ictp.trieste.it/full_display.php?smr=0&ida=a06210

Description of the scientific content

The school had 24 invited lecturers. 10 of them gave courses on the basic principles of frustrated magnetism: C. Lacroix on "Atomic magnetism and exchange", J. Chalker on "Spin-waves and thermal fluctuations", A. Tsvelik on "Field-theory approaches to magnetic systems", W. Brenig on "Linear response theory and dynamical correlations", G. Misguich on "2D quantum magnetism", A. Läuchli on "Numerical simulations". J. Greedan on "Synthesis, crystal growth and structural determination", R. Kremer on "Thermodynamic measurements", S. Bramwell on "Neutron scattering", P. Carretta on "Nuclear Magnetic Resonance". The remaining 14 lecturers covered more advanced topics, related to recent developments on theoretical and experimental techniques: A. Auerbach on "Large-N and Schwinger bosons", A. Keren on " μ -SR", J. Deisenhofer on "Light scattering: infra-red and Raman", R. Valenti on "Ab-initio calculations", F. Mila on "Strong-coupling expansions", M. Gingras on "Spin ice", P. Mendels on "Kagome: experimental aspects", J. van der Brink on "Orbital degeneracy in spinels", K. Penc on "Quadrupolar and nematic order", M. Takigawa on "Magnetization plateaux", O. Tchernyshyov on "Spin-lattice coupling", S. Sorella on " $J_1 - J_2$ and variational Monte Carlo", D. Poilblanc on "Doped frustrated magnets", R. Moessner on "Quantum Dimer Models".

The workshop covered many subjects of recent research in frustrated materials with 61 speakers and one poster session.

One important issue was about the recent developments in the synthesis and characterization of Kagome antiferromagnets (A. Harrison, Y. Lee, F. Bert). Particular emphasis was given to $\text{ZnCu}_3(\text{OH})_6\text{Cl}_2$, an almost perfect 2D spin-1/2 Kagome lattice, that has generated much excitement in the field. Indeed, this compound is found to have no transition to a magnetic state down to 50mK, as theoretically expected for the Kagome Heisenberg antiferromagnet. The tremendous experimental effort currently under way to unveil the properties of $\text{ZnCu}_3(\text{OH})_6\text{Cl}_2$ is typical of a very hot topic.

Thermodynamic, transport, and NMR measurements for organic materials have been reported (K. Kanoda). These compounds can be described by an anisotropic 2D triangular lattice and, by varying the external pressure, it is possible to study a metal-insulator transition (Mott transition). The existence of very low-energy charge excitations even in the insulating phase makes the characterization of these materials very challenging. The nature of the insulating phase is still debated, but it is presumably some kind of spin liquid down to very low temperatures. The nature of the Mott transition in presence of frustration has also been discussed in a theoretical talk (H. Tsunetsugu), where DMFT results have been presented and could explain some of the experimental aspects of organic materials.

Pyrochlores and spinels are two families of compounds that have been largely investigated in the recent past. These materials show an enormous variety of compositions and physical properties. The highly frustrated structure of the lattice leads to a subtle interplay between magnetism and different disordered states. In particular, $\text{Tb}_2\text{Ti}_2\text{O}_7$ is a very promising system for having a cooperative paramagnet down to low temperatures (B. Gaulin). Other aspects of pyrochlores and spinels compounds (like spin fluctuations) have been also largely discussed (I. Mirebeau, A. Loidl, H. Takagi). A theory of the remarkable ordering in spinels in which the A sites forming a diamond lattice are the magnetic sites has been presented by L. Balents. The effects of dilution and of an external magnetic field in spin-ice compounds have also been discussed (P. Shiffer, L.

Jaubert).

One of the most spectacular effects of frustration is the presence of magnetization plateaux. Talks covered important results that have been obtained in 2D systems (A. Honecker, T. Ziman, S. Miyahara). A remarkable possibility is the stabilization of the analog of a supersolid between the plateaux, a state that retains the broken translational symmetry of a plateau phase while developing the equivalent of a superfluid component through the ordering of spin components perpendicular to the field. Several aspects of the supersolid phase have been discussed in two theoretical talks (K. Damle, K.P. Schmidt)

Some talks were devoted to different aspects of dimer models or their generalizations (A. Ralko, F. Pollman, M. Mambrini). These models are usually used to describe the low-energy properties of magnetically disordered systems. The discussion was articulated around their actual relation with real spin models, their possible generalization to include hole doping, and their relevance to describe the checkerboard lattice.

The problem of orbital degeneracy in Mott insulators and its interplay with magnetism has been discussed in the talks of D. Khomskii and A.M. Oles. While orbitals usually order, leading to effective magnetic models with reduced symmetry (often one-dimensional), orbitals have been predicted to fluctuate strongly in certain circumstances, leading to a spin-orbital entanglement that can modify the Goodenough-Kanamori rules of magnetic exchange.

Magnetic systems can in principle develop long range order without local moments, a phenomenon known as nematic order. Such systems break the rotational symmetry in spin space, yet the local order parameter is not a local moment. Considerable progress has been achieved recently in identifying this kind of order in magnetic models. A session was devoted to the possibility to have nematic order in spin systems (N. Shannon, K. Penc, T. Momoi). Although some progress has been done for describing $S=1$ models, in particular on the triangular lattice, the case of $S=1/2$ models is still much debated and need more investigations.

A series of sessions have been devoted to 1D systems (B. Lake, P. Lecheminant, P. Azaria, F. Essler, R. Konik). In particular, much emphasis has been given to the recent progress in the calculations of dynamical properties (J.S. Caux) and also the possibility to consider the effects of the curvature in the electronic band near the Fermi level (M. Pustilnik, I. Zaliznyak). A talk (R. Coldea) discussed the effect of the magnetic field in Ising-like magnetic systems.

Finally, a very interesting talk presented a phenomenological theory of high-temperature superconductors (A. Tsvelik).

Impact of the event

Both fields of highly frustrated magnetism and correlated systems in 1D are at present rapidly developing, relating fundamental conceptual aspects to modelling problems as well as materials related questions. This activity brought together experimentalists and theorists working on different aspects and using different but complementary techniques. The exchange took place at a very high level and provided a good opportunity to clarify the state of the art. Moreover, the school covered a wide range of topics, from the fundamental ones to the more advanced ones, giving an excellent introduction to the field to younger students. A substantial part of the

ICTP support was given to people coming from the developing countries. The importance of the activity was also highlighted by the large number of steering committee members present, as well as by a strong participation from outside Europe (North America and Japan). This gave a large number of younger participants the chance to interact with world-renowned experts in the field at the highest scientific level. The excellent local organization of the workshop by R. del Rio and M. Iqbal at ICTP helped to prepare a very productive environment.

In conclusion, the whole activity accomplished its purpose: it gave an excellent introduction to the field of highly frustrated magnetism to young students and researchers and it considered current key issues in the physics of frustrated systems and low-dimensional models, identifying prospective routes for further studies in these exciting fields.



School and workshop on Highly Frustrated Magnets and Strongly Correlated Systems: From Non-Perturbative Approaches to Experiments

(ICTP, Trieste, 30 July - 17 August 2007)

Financial Statement
(in Euro)

Income

Contribution from the European Science Foundation	Euro	40,000.00
- Advance (80% of first pledge i.e. Euro 50,000) received on 30 May 2007	Euro	40,000.00
- Balance (remaining 20%) plus additional funds (i.e. Euro 20,000) still to be received	Euro	30,000.00
Total Euro		70,000.00

Expenditures

Name	Nationality	Travel	Accommodation	D.L.A.	Total
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a) *Workshop Speakers and Directors*

ABENDSCHEIN, Andreas	Germany	---	---	650.00	650.00
AKRAP, Ana	Croatia	---	---	850.00	850.00
AMENT, Lucas j.	The Netherlands	---	---	1,000.00	1,000.00
AUERBACH, Assa	Israel	657.90	130.00	150.00	937.90
BALENTS, Leon	U.S.A.	1,130.02	156.00	180.00	1,466.02
BECCA, Federico	Italy	---	---	500.00	500.00
BERLETH, Heike	Germany	---	---	550.00	550.00
BHASSEN, Maraculous	United Kingdom	---	---	500.00	500.00
BIERI, Samuel	Switzerland	---	---	750.00	750.00
BRAMWELL, Steven	United Kingdom	182.10	130.00	500.00	812.10
BRENIG, Wolfram	Germany	220.27	104.00	120.00	444.27
BROHOLM, Collin Leslie	U.S.A.	350.00	---	500.00	850.00
CALDER, Stuart	United Kingdom	---	---	500.00	500.00
CARRETTA, Pietro	Italy	---	---	336.00	336.00
CASTELNUOVO, Claudio	Italy	---	---	600.00	600.00
CAUX, Jean-Sebastien	Canada	300.00	---	450.00	750.00
CHALKER, John	United Kingdom	395.86	234.00	270.00	899.86
CHARRIER, Daniel	France	---	---	600.00	600.00
CHERNYSHEV, Alexander	Russian Federation	---	---	500.00	500.00
COLDEA, Radu	Romania	175.71	104.00	120.00	399.71
DAMLE, Kedar	India	300.00	324.00	171.00	795.00
DEISENHOFER, Joachim	Germany	211.94	260.00	300.00	771.94
DOBRY, Ariel Oscar	Argentina	586.29	247.00	361.00	1,194.29
DORIER, Julien	Switzerland	---	---	500.00	500.00
ESSLER, Fabian	Germany	---	396.00	660.00	1,056.00
FERRERO, Michel	Switzerland	---	---	950.00	950.00
GAULIN, Bruce	Canada	1,275.92	286.00	330.00	1,891.92
GINGRAS, Michel J.	Canada	1,506.96	260.00	600.00	2,366.96
GOREN, Lilach	Israel	---	---	900.00	900.00
GREEDAN, Jhon E.	Canada	1,229.51	130.00	150.00	1,509.51
GREITER, Martin	Austria	---	---	1,000.00	1,000.00

To be carried forward: 8,522.48 2,761.00 15,548.00 26,831.48

	<i>Brought forward :</i>	<i>8,522.48</i>	<i>2,761.00</i>	<i>15,548.00</i>	<i>26,831.48</i>
HARRISON, Andrew	United Kingdom	317.05	78.00	90.00	485.05
HOLDSWORTH, Peter	United Kingdom	---	---	450.00	450.00
HONECKER, Joachim	Germany	---	---	600.00	600.00
JAMES, Andrew	United Kingdom	---	---	1,000.00	1,000.00
JAUBERT, Ludovic	France	---	---	1,000.00	1,000.00
KANODA, Kazushi	Japan	---	---	500.00	500.00
KEREN, Amit	Israel	523.62	156.00	180.00	859.62
KHOMSKII, Daniel	The Netherlands	---	---	600.00	600.00
KONIK, Robert	Canada	935.99	208.00	240.00	1,383.99
KREMER, Reinhard	Germany	328.85	234.00	270.00	832.85
LAKE, Bella	United Kingdom	---	260.00	300.00	560.00
LANG, Thomas	Austria	---	---	900.00	900.00
LANTE, Valeria	Italy	---	---	750.00	750.00
LAUCHLI, Andreas	Switzerland	211.99	260.00	300.00	771.99
LOIDL, Alois	Germany	---	182.00	210.00	392.00
MILA, Frederic	France	128.32	468.00	1,340.00	1,936.32
MIREBEAU, Isabelle	France	---	---	200.00	200.00
MOESSNER, Roderich	Germany	78.87	364.00	420.00	862.87
MOLINER, Marion	France	---	---	1,000.00	1,000.00
NILSEN, Goran jan	Norway	---	---	700.00	700.00
OFER, Oren	Israel	---	---	550.00	550.00
OLARIU, Areta	Romania	---	---	450.00	450.00
OLES, Andrzej	Poland	---	169.00	247.00	416.00
PENC, Karlo	Hungary	248.02	260.00	300.00	808.02
PICKELS, Thomas Stanley	United Kingdom	---	---	500.00	500.00
PIEPER, Oliver	Germany	---	---	500.00	500.00
PRSA, Krunoslav	Croatia	---	---	1,050.00	1,050.00
RICO ORTEGA, Enrique	Spain	---	---	950.00	950.00
ROMHANYI, Judit	Hungary	---	---	500.00	500.00
SAUNDERS, Timothy	United Kingdom	---	---	600.00	600.00
SCHEIB, Patric	Germany	---	---	500.00	500.00
SCHIFFER, Peter	U.S.A.	1,124.53	130.00	150.00	1,404.53
SEABRA, Luis Miguel	Portugal	---	---	1,000.00	1,000.00
SIKORA, Olga Anna	Poland	---	---	1,000.00	1,000.00
SMILJANIC, Igor	Croatia	---	---	950.00	950.00
SORET, Julien	France	---	---	1,000.00	1,000.00
SUDAN, Julien	Switzerland	---	---	950.00	950.00
SZALLAS, Attila	Hungary	---	---	1,000.00	1,000.00
TAKAGI, Hindenori	Japan	1,382.15	208.00	240.00	1,830.15
TAKIGAWA, Masashi	Japan	1,478.35	208.00	240.00	1,926.35
TCHERNYSHYOV, Oleg	Russian Federation	1,108.27	208.00	240.00	1,556.27
THOMALE, Ronny	Germany	---	---	950.00	950.00
TOHT, Tamas Andras	Hungary	---	---	1,000.00	1,000.00
TROUSSELET, Fabien	France	---	---	600.00	600.00
TSUNETSUGU, Hirokazu	Japan	---	104.00	120.00	224.00
VALENTI, Roser	Spain	295.03	182.00	210.00	687.03
VAN DER BRINK, Jeroen	The Netherlands	305.39	78.00	90.00	473.39
ZALIZNYAK, Igor	Russian Federation	916.16	234.00	300.00	1,450.16
ZORKO, Andrej	Slovenia	---	---	950.00	950.00
	Subtotal a):	17,905.07	6,752.00	43,735.00	68,392.07

b) *Miscellanea*

Secretarial and Technical costs of overtime
C.T.I. (Official dinner of ESF Steering Committee)
UniCredit Banca (bank commission for payments)

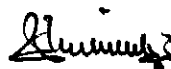
1,677.35
113.70
103.22

Subtotal b): 1,894.27

Total a) + b) : 70,286.34



Prepared by : A. Ricci
Finance Office



Cleared by : Andrej Michelcich
Finance Officer



School and Workshop on Highly Frustrated Magnets and Strongly Correlated Systems: From Non-Perturbative Approaches to Experiments

Cosponsor(s): European Science Foundation
Organizer(s): F. Becca, F. Essler, F. Mila, S. Shastry, A. Tsvetik
Trieste - Italy, 30 July 2007 - 17 August 2007

Venue: Main Building Main Lecture Hall

Final programme

Monday, 30 July 2007 (Room: Main Building Main Lecture Hall)

- 08:30 - 10:30** (Room: Main Building, Lobby)
--- Registration and Administrative formalities ---
- 10:30 - 11:00** **K.R. Sreenivasan-ICTP Director** / *F. Mila and P. Mendels - School Organizers*
Welcome and Introduction
- 11:00 - 11:45** **Claudine Lacroix** / *Laboratoire Louis Neel, France*
Atomic magnetism and exchange
- 11:45 - 12:30** **Claudine Lacroix** / *Laboratoire Louis Neel, France*
Atomic magnetism and exchange
- 12:30 - 14:30** --- Lunch ---
- 14:30 - 15:15** **John E. Greedan** / *Dept. of Chemistry McMaster University, Canada*
Synthesis, crystal growth and structural determination
- 15:15 - 16:00** **John E. Greedan** / *Dept. of Chemistry McMaster University, Canada*
Synthesis, crystal growth and structural determination
- 16:00 - 16:30** --- Coffee break ---

- 16:30 - 17:15** **Claudine Lacroix** / *Laboratoire Louis Neel, France*
Tutorial
- 17:15 - 18:00** **Claudine Lacroix** / *Laboratoire Louis Neel, France*
Tutorial
- 18:00 - 18:45** **John E. Greedan** / *Dept. of Chemistry McMaster University, Canada*
Tutorial
- 18:45 - 19:30** **John E. Greedan** / *Dept. of Chemistry McMaster University, Canada*
Tutorial

Tuesday, 31 July 2007 (Room:Main Building Main Lecture Hall)

- 09:00 - 09:45** **Reinhard Kremer** / *MPI fuer Festkoerperforschung Stuttgart*
Thermodynamic measurements
- 09:45 - 10:30** **Reinhard Kremer** / *MPI fuer Festkoerperforschung Stuttgart*
Thermodynamic measurements
- 10:30 - 11:00** --- Coffee break ---
- 11:00 - 11:45** **John T. Chalker** / *Theoretical Physics, Oxford*
Spin-waves and thermal fluctuations
- 11:45 - 12:30** **John T. Chalker** / *Theoretical Physics, Oxford*
Spin-waves and thermal fluctuations
- 12:30 - 15:30** --- Lunch ---
- 15:30 - 16:15** **Reinhard Kremer** / *MPI fuer Festkoerperforschung Stuttgart*
Tutorial
- 16:15 - 17:00** **Reinhard Kremer** / *MPI fuer Festkoerperforschung Stuttgart*
Tutorial
- 17:00 - 17:30** --- Coffee break ---
- 17:30 - 18:15** **John T. Chalker** / *Theoretical Physics, Oxford*
Tutorial
- 18:15 - 19:00** **John T. Chalker** / *Theoretical Physics, Oxford*
Tutorial

Wednesday, 1 August 2007 (Room:Main Building Main Lecture Hall)

- 09:00 - 09:45** **Alexei Tsvelik** / *Brookhaven National Laboratory*
Field-theory approaches to magnetic systems
- 09:45 - 10:30** **Alexei Tsvelik** / *Brookhaven National Laboratory*
Field-theory approaches to magnetic systems
- 10:30 - 11:00** --- Coffee break ---

- 11:00 - 11:45** **Wolfram Brenig / Technical University Braunschweig**
Linear response theory and dynamical correlations
- 11:45 - 12:30** **Wolfram Brenig / Technical University Braunschweig**
Linear response theory and dynamical correlations
- 12:30 - 15:30** --- Lunch ---
- 15:30 - 16:15** **Alexei Tselik / Brookhaven National Laboratory**
Tutorial
- 16:15 - 17:00** **Alexei Tselik / Brookhaven National Laboratory**
Tutorial
- 17:00 - 17:30** --- Coffee break ---
- 17:30 - 18:15** **Wolfram Brenig / Technical University Braunschweig**
Tutorial
- 18:15 - 19:00** **Wolfram Brenig / Technical University Braunschweig**
Tutorial

Thursday, 2 August 2007 (Room:Main Building Main Lecture Hall)

- 09:00 - 09:45** **Steven T. Bramwell / University College London**
Neutron scattering
- 09:45 - 10:30** **Steven T. Bramwell / University College London**
Neutron scattering
- 10:30 - 11:00** --- Coffee break ---
- 11:00 - 11:45** **Pietro Carretta / Dipartimento di Fisica "A. Volta", Pavia**
Nuclear Magnetic Resonance
- 11:45 - 12:30** **Pietro Carretta / Dipartimento di Fisica "A. Volta", Pavia**
Nuclear Magnetic Resonance
- 12:30 - 15:30** --- Lunch ---
- 15:30 - 16:15** **Steven T. Bramwell / University College London**
Tutorial
- 16:15 - 17:00** **Steven T. Bramwell / University College London**
Tutorial
- 17:00 - 17:30** --- Coffee break ---
- 17:30 - 18:15** **Pietro Carretta / Dipartimento di Fisica "A. Volta", Pavia**
Tutorial
- 18:15 - 19:00** **Pietro Carretta / Dipartimento di Fisica "A. Volta", Pavia**
Tutorial

Friday, 3 August 2007 (Room:Main Building Main Lecture Hall)

- 09:00 - 09:45** **Gregoire Misguich** / *Service de Physique Theorique CEA Saclay*
2D quantum magnetism
- 09:45 - 10:30** **Gregoire Misguich** / *Service de Physique Theorique CEA Saclay*
2D quantum magnetism
- 10:30 - 11:00** --- Coffee break ---
- 11:00 - 11:45** **Assa Auerbach** / *Physics Department, Technion, Haifa*
Large-N and Schwinger bosons
- 11:45 - 12:30** **Amit Keren** / *Physics Department, Technion, Haifa*
mu-SR
- 12:30 - 15:30** --- Lunch ---
- 15:30 - 16:15** **Gregoire Misguich** / *Service de Physique Theorique CEA Saclay*
Tutorial
- 16:15 - 17:00** **Gregoire Misguich** / *Service de Physique Theorique CEA Saclay*
Tutorial
- 17:00 - 17:30** --- Coffee break ---
- 17:30 - 18:15** **Assa Auerbach** / *Physics Department, Technion, Haifa*
Tutorial
- 18:15 - 19:00** **Amit Keren** / *Physics Department, Technion, Haifa*
Tutorial
- 19:00 - 20:00** **Poster Session and get-together drink**

Saturday, 4 August 2007 (Room:Main Building Main Lecture Hall) (Saturday)

- 09:00 - 09:45** **Joachim Deisenhofer** / *University of Geneva*
Light scattering: infra-red and Raman
- 09:45 - 10:30** **Roser Valenti** / *Institut fur Theoretische Physik, University Frankfurt*
Ab-initio calculations
- 10:30 - 11:00** --- Coffee break ---
- 11:00 - 11:45** **Frederic Mila** / *Ecole Polytechnique Federale de Lausanne*
Strong-coupling expansions
- 11:45 - 12:30** **Michel Gingras** / *University of Waterloo, Canada*
Spin ice
- 12:30 - 15:30** --- Lunch ---
- 15:30 - 16:15** (Room: Adriatico Guest House Kastler Lecture Hall)
Andreas Laeuchli / *Ecole Polytechnique Federale de Lausanne*
Numerical simulations

- 16:15 - 17:00** (Room: Adriatico Guest House Kastler Lecture Hall)
Andreas Laeuchli / *Ecole Polytechnique Federale de Lausanne*
Numerical simulations
- 17:00 - 17:30** (Room: Adriatico Guest House Cafeteria)
 --- Coffee break ---
- 17:30 - 18:15** (Room: Adriatico Guest House Informatics Lab.)
Andreas Laeuchli / *Ecole Polytechnique Federale de Lausanne*
Tutorial
- 18:15 - 19:00** (Room: Adriatico Guest House Informatics Lab.)
Andreas Laeuchli / *Ecole Polytechnique Federale de Lausanne*
Tutorial

Monday, 6 August 2007 (Room:Main Building Main Lecture Hall)

- 09:00 - 09:45** **Philippe Mendels** / *University Paris-Sud Orsay*
Kagome: experimental aspects
- 09:45 - 10:30** **Jeroen van der Brink** / *Institute-Lorentz for Theoretical Physics, University Leiden*
Orbital degeneracy in spinels
- 10:30 - 11:00** --- Coffee break ---
- 11:00 - 11:45** **Karlo Penc** / *MTA SzFKI, Hungary*
Quadrupolar and nematic order
- 11:45 - 12:30** **Masashi Takigawa** / *University of Tokyo*
Magnetization plateaux
- 12:30 - 14:30** --- Lunch ---
- 14:30 - 15:15** **Joachim Deisenhofer** / *University of Geneva*
Tutorial
- 15:15 - 16:00** **Roser Valenti** / *Institut fur Theoretische Physik, University Frankfurt*
Tutorial
- 16:00 - 16:45** **Frederic Mila** / *Ecole Polytechnique Federale de Lausanne*
Tutorial
- 16:45 - 17:15** --- Coffee break ---
- 17:15 - 18:00** **Michel Gingras** / *University of Waterloo, Canada*
Tutorial
- 18:00 - 18:45** **Philippe Mendels** / *University Paris-Sud Orsay*
Tutorial
- 18:45 - 19:30** **Jeroen van der Brink** / *Institute-Lorentz for Theoretical Physics, University Leiden*
Tutorial

Tuesday, 7 August 2007 (Room:Main Building Main Lecture Hall)

- 09:00 - 09:45** **Oleg Tchernyshyov / Johns Hopkins University**
Spin-lattice coupling in antiferromagnetic spinels
- 09:45 - 10:30** **Sandro Sorella / SISSA, Trieste**
J1-J2 and variational Monte Carlo
- 10:30 - 11:00** --- Coffee break ---
- 11:00 - 11:45** **Didier Poilblanc / University Paul Sabatier, Toulouse**
Doped frustrated magnets
- 11:45 - 12:30** **Roderich Moessner / Rudolf Peierls Centre for Theoretical Physics, Oxford**
Quantum Dimer Models
- 12:30 - 14:30** --- Lunch ---
- 14:30 - 15:15** **Karlo Penc / MTA SzFKI, Hungary**
Tutorial
- 15:15 - 16:00** **Masashi Takigawa / University of Tokyo**
Tutorial
- 16:00 - 16:45** **Oleg Tchernyshyov / Johns Hopkins University**
Tutorial
- 16:45 - 17:15** --- Coffee break ---
- 17:15 - 18:00** **Sandro Sorella / SISSA, Trieste**
Tutorial
- 18:00 - 18:45** **Didier Poilblanc / University Paul Sabatier, Toulouse**
Tutorial
- 18:45 - 19:30** **Roderich Moessner / Rudolf Peierls Centre for Theoretical Physics, Oxford**
Tutorial

Wednesday, 8 August 2007 (Room:Main Building Main Lecture Hall)

- 08:30 - 09:30** (Room: Main Building, Lobby)
--- REGISTRATION AND ADMINISTRATIVE FORMALITIES (ONLY FOR NEWLY ARRIVED) ---
- 09:45 - 10:00** **F. Becca, F. Essler, F. Mila, A. Tsvelik**
Welcome and Introduction

One-dimensional systems (I)

Chairperson: Fabian Essler

8 August 2007

- 10:00 - 10:40** **Bella Lake / Hahn-Meitner-Institut Berlin**
Magnetic excitation spectrum of doped and undoped spin ladders

- 10:40 - 11:20 **Jean-Sebastien Caux** / *Universiteit van Amsterdam*
The dynamics of Heisenberg spin chains
- 11:20 - 12:00 **Radu Coldea** / *University of Bristol*
Bound states in an Ising magnet in applied field
- 12:00 - 12:20 **Michael Pustilnik** / *Georgia Institute of Technology*
1D fermions beyond the Luttinger liquid paradigm
- 12:20 - 16:00 --- Lunch ---

Triangular and triangle based lattices (I)

Chairperson: Gregoire Misguich

8 August 2007

- 16:00 - 16:40 **Kazushi Kanoda** / *The University of Tokyo*
Strongly correlated electrons on triangular lattice in organics
- 16:40 - 17:20 **Michael Zhitomirsky** / *Commissariat a l'Energie Atomique, Grenoble*
Unusual dynamics of noncollinear quantum antiferromagnets
- 17:20 - 17:40 **Chisa Hotta** / *Aoyama Gakuin University*
Geometrically frustrated charges on the anisotropic triangular lattices
- 17:40 - 18:00 **Ana Akrap** / *Ecole Polytechnique Federale de Lausanne*
Competing orders in a quasi one-dimensional two-band conductor

Thursday, 9 August 2007 (Room:Main Building Main Lecture Hall)

Classical and semiclassical approaches

Chairperson: John T. Chalker

9 August 2007

- 10:00 - 10:40 **M. Joseph Bhaseen** / *University of Oxford*
Path Integral Approach to Frustrated Antiferromagnets
- 10:40 - 11:00 **Timothy Saunders** / *University of Oxford*
Spin Freezing in Geometrically Frustrated Antiferromagnets with Weak Bond Disorder

Triangular and triangle based lattices (II)

Chairperson: Michael Zhitomirsky

9 August 2007

- 12:20 - 12:40 **Alexander Chernyshev** / *University of California, Irvine*
Finite-size scaling of the Neel order parameter
- 12:40 - 13:00 **Areta Olariu** / *University Paris-Sud Orsay*
Unconventional dynamics in a canonical triangular antiferromagnet

13:00 - 16:00 --- Lunch ---

Spin ice
Chairperson: Roderich Moessner

9 August 2007

16:00 - 16:40 Peter Schiffer / *Pennsylvania State University*
Freezing in Spin Ice: Stuffed, Diluted, and Artificial

16:40 - 17:00 Ludovic Jaubert / *Ecole Normale Supérieure de Lyon*
A three dimensional Kasteleyn transition; spin ice in a [100] field

Frustration and Quantum Information
Chairperson: Roderich Moessner

9 August 2007

17:00 - 17:20 Fabien Alet / *University Paul Sabatier, Toulouse*
Valence Bond Entanglement Entropy

17:20 - 17:40 Claudio Castelnovo / *University of Oxford*
Spin ice beyond the ice rules

17:40 - 18:00 Adolfo Avella / *University of Salerno*
Frustration-driven QPT in the ferromagnetic 1D extended anisotropic Heisenberg model

18:00 - 18:20 Martin Greiter / *University of Karlsruhe*
Non-abelian statistics in a quantum antiferromagnet

18:30 - 20:30 --- Reception ---

Friday, 10 August 2007 (Room:Main Building Main Lecture Hall)

Spin-1/2 Kagome (I)
Chairperson: Philippe Mendels

10 August 2007

09:00 - 09:40 Andrew Harrison / *Institut Laue-Langevin, Grenoble*
Classical and non-classical behaviour in real kagome antiferromagnets

09:40 - 10:20 Young Lee / *Massachusetts Institute of Technology*
Neutron scattering studies of frustrated kagome antiferromagnets

Spin-1/2 Kagome (II)
Chairperson: Philippe Mendels

10 August 2007

- 10:40 - 11:00** **Fabrice Bert** / *University Paris-Sud Orsay*
Frustrated magnetism in the $S=1/2$ kagome $ZnCu_3(OH)_6Cl_2$ compound
- 11:00 - 11:20** **Oren Ofer** / *Israel Institute of Technology, Haifa*
Ground State and excitation properties of the hebertsmithite studied by local probs
- 11:20 - 11:40** **Ioannis Rousochatzakis** / *Ecole Polytechnique Federale de Lausanne*
Highly Frustrated Antiferromagnetic Heisenberg polytopes
- 11:40 - 15:00** --- Lunch ---

Spinels

10 August 2007

- 15:00 - 15:40** **Hidenori Takagi** / *University of Tokyo*
New and old spinel oxides with geometrical frustration
- 15:40 - 16:20** **Leon Balents** / *University of California, Santa Barbara*
Frustration and fluctuations in various spinel antiferromagnets

Mott transition

Chairperson: **Claudine Lacroix**

10 August 2007

- 16:40 - 17:20** **Hirokazu Tsunetsugu** / *University of Tokyo*
Mott transition and magnetic properties on frustrated lattices

Neutrons and frustrated magnets: A review

Chairperson: **Claudine Lacroix**

10 August 2007

- 17:20 - 18:00** **Collin L. Broholm** / *Johns Hopkins University*
Neutron scattering from frustrated magnets

Monday, 13 August 2007 (Room:Main Building Main Lecture Hall)

Magnetization plateaux

Chairperson: **Hidenori Takagi**

13 August 2007

- 09:00 - 09:40** **J. Andreas Honecker** / *University of Gottingen*
Magnetization process of two-dimensional highly frustrated spin-1/2 quantum antiferromagnets
- 09:40 - 10:20** **Timothy Ziman** / *Institut Laue Langevin and CNRS*
Magnetization plateaux of triangular molecular magnets in and out of equilibrium

10:20 - 10:40 Shin Miyahara / *University of Tokyo*
Magnetization plateaux in frustrated two-dimensional systems

10:40 - 16:00 --- Lunch ---

Supersolids and bosonic models

Chairperson: Frederic Mila

13 August 2007

16:00 - 16:40 Kedar Suresh Damle / *Tata Institute of Fundamental Research, Mumbai*
Variational wavefunction study of triangular lattice supersolid at half-filling

16:40 - 17:00 Kai Phillip Schmidt / *Ecole Polytechnique Federale de Lausanne*
Looking for Supersolids in Frustrated Quantum Magnets

Dimer Models

Chairperson: Frederic Mila

13 August 2007

17:00 - 17:20 Arnaud Ralko / *University Paul Sabatier, Toulouse*
Phase separation and flux quantization in the doped quantum dimer model

17:20 - 17:40 Frank Pollman / *Max Planck Institute for Physics of Complex Systems, Dresden*
Strongly correlated fermions on frustrated lattices

17:40 - 18:00 Matthieu Mambrini / *University Paul Sabatier, Toulouse*
Characterizing singlet states with SU(2) dimers

Tuesday, 14 August 2007 (Room:Main Building Main Lecture Hall)

One-dimensional systems (II)

Chairperson: Alexei Tsvelik

14 August 2007

10:00 - 10:40 Philippe Lecheminant / *University of Cergy-Pontoise, CNRS*
Competing orders in two-leg spin ladder with four-spin exchange interactions

10:40 - 11:20 Patrick Azaria / *University Pierre et Marie Curie, CNRS*
Confinement and Superfluidity in 1D Fermionic Cold Atoms

11:20 - 12:00 Igor Zaliznyak / *Brookhaven National Laboratory*
Spinons in strongly correlated chain cuprates

12:00 - 12:20 Ariel O. Dobry / *Universidad Nacional de Rosario*
The Spin Peierls transition beyond the adiabatic approximation

12:20 - 16:00 --- Lunch ---

Tetrahedra based and other complex structures

Chairperson: Andrzej M. Oles

14 August 2007

- 16:00 - 16:20 **Oksana Zaharko** / *ETH Zurich & Paul Scherrer Institute*
Isolated tetrahedra system $\text{Cu}_4\text{OCl}_6\text{daca}_4$: the magnetic exchange picture
- 16:20 - 16:40 **Ana Smontara** / *Institute of Physics, Zagreb*
Probing the spin-gap in the HFM systems by thermal conductivity
- 16:40 - 17:00 **Michel Gingras** / *University of Waterloo, Canada*
Are frustrated antiferromagnets with Gd on corner-shared triangles and tetrahedra complex or not?

Hubbard Model

Chairperson: Andrzej M. Oles

14 August 2007

- 17:20 - 17:40 **Peter C.W. Holdsworth** / *Ecole Normale Supérieure de Lyon*
Magnetic properties of La_2CuO_4 . The Hubbard model and the dilution problem
- 17:40 - 18:00 **Federico Becca** / *SISSA, Trieste*
Variational description of Mott insulators with charge fluctuations
- 18:00 - 20:00 **Poster Session and get-together drink**

Wednesday, 15 August 2007 (Room: Main Building Main Lecture Hall)

Pyrochlores

Chairperson: Michel Gingras

15 August 2007

- 10:00 - 10:40 **Isabelle Mirebeau** / *CNRS, Gif Sur Yvette*
Magnetic ground state and spin excitations in Terbium pyrochlores
- 10:40 - 11:20 **Bruce D. Gaulin** / *McMaster University, Canada*
Fluctuations and Order of the Pyrochlore Antiferromagnet $\text{Tb}_2\text{Ti}_2\text{O}_7$
- 11:20 - 12:00 **Alois Loidl** / *University Augsburg, Germany*
Frustrated Lattices in Spinel Compounds
- 12:00 - 12:20 **George Jackeli** / *Ecole Polytechnique Federale de Lausanne*
Dimer phases of orbitally degenerate quantum antiferromagnets
- 12:20 - 16:00 --- Lunch ---

Orbital degeneracy

Chairperson: Karlo Penc

15 August 2007

- 16:00 - 16:40** **Daniil I. Khomskii / University of Cologne**
Charge ordering as an alternative to Jahn-Teller distortion: A novel feature close to Mott transition
- 16:40 - 17:20** **Andrzej M. Oles / Max Planck Institute, Stuttgart**
Frustration and entanglement in spin-orbital superexchange models
- 17:20 - 17:40** **Francois H. Vernay / University of Waterloo, Canada**
Cu K-edge Resonant Inelastic X-Ray Scattering in edge-sharing cuprates
- 17:40 - 18:00** **Michael Sing / University of Wurzburg, Germany**
Unusual spin-Peierls physics of oxyhalides
- 18:00 - 18:20** **Stefan-Ludwig Drechsler / IFW-Dresden**
Theoretical aspects of helimagnetism and related properties in frustrated edge-shared CuO₂ chain compounds

Thursday, 16 August 2007 (Room:Main Building Main Lecture Hall)

Nematic order
Chairperson: Federico Becca

16 August 2007

- 10:00 - 10:40** **Nicholas S.P. Shannon / University of Bristol**
How to have fun with frustrated ferromagnets
- 10:40 - 11:00** **Tsutomu Momoi / The Institute of Physical and Chemical Research (RIKEN), Japan**
Octupolar order in the multiple spin exchange model on a triangular lattice
- 11:00 - 11:20** **Karlo Penc / MTA SzFKI, Hungary**
Quadrupolar phases of S=1 models on the triangular lattice
- 11:20 - 11:40** **Sylvain Capponi / University Paul Sabatier, Toulouse**
Spin nematic phases in an itinerant correlated electronic system
- 11:40 - 12:00** **Gia-Wei Chern / Johns Hopkins University**
Spin nematic in a classical pyrochlore antiferromagnet
- 12:00 - 16:00** --- Lunch ---

One-dimensional systems (III)
Chairperson: Bella Lake

16 August 2007

- 16:00 - 16:40** **Fabian Essler / University of Oxford**
Temperature effects on spin correlations in integer spin Heisenberg chains
- 16:40 - 17:20** **Robert Konik / Brookhaven National Laboratory**
Numerical and DMRG for Coupled Continuum One Dimensional Systems
- 17:20 - 18:00** **Alexei Tsvelik / Brookhaven National Laboratory**
1D models of non-Abelian excitations

Friday, 17 August 2007 (Room:Main Building Main Lecture Hall)

Free discussions