

# LEONARDO PISANI

## CAREER HISTORY

### Sabbatical period

Mar.'13-Sep'16

- After years of metropolitan living and intense work schedule I decided to retreat to the beautiful landscape of the Nature Reserve of Mount San Vicino, where my mother came from.
- Collaboration (Jul.'13-Apr.'14) with Prof. T. Maitra (Indian Institute of Technology, Roorkee) on geometrically frustrated magnetic systems with competing orbital degrees of freedom.

### Commerzbank, London

Mar.'08-Mar'13

#### Quantitative Analyst

- Front office role within the foreign exchange (FX) financial engineering team aimed at the development of the pricing (C++) library and live support of structuring, trading and sales desks.
- Complete knowledge of FX market conventions and FX volatility surface construction.
- Familiar with models of Local Volatility, Local Stochastic Volatility, FX-IR Hybrid and numerical techniques like Monte-Carlo and Finite Difference Methods (generalised Crank-Nicholson).
- Theory of arbitrage pricing, stochastic differential equations and Ito's calculus.
- Implemented risk engine for generation of greeks and bid ask prices (C++) across the full range of FX products: options, vanilla strategies, exotic and structured products.
- Implemented a consistent framework for the estimation of non hedgeable risk.
- Developed structured and exotic (/// generation) products via the proprietary payout language within single and multicurrency (local correlation model) frameworks.
- Generated analytical solutions for very fast pricing of exotic products.
- Validated and tested the FX risk management system.
- Integrated risk engine with the parallel computation engine.
- Developed interface utilities for the interconnection of the core library with the in-house pricers, volatility management system and e-Commerce.
- Coordination of offshore outsourcing of IT development.
- Liaised with the onshore IT departments on deployment and maintenance of pricing GUI.
- Created a number of multitasking, flexible and user-friendly spreadsheets for the structuring desk via the use of Excel-VBA.

### Imperial College London

Nov.'05-Nov.'07

#### Post-doctoral Research Associate

- Investigation of possible routes to carbon-based magnetism via *Density Functional Theory*, in the computational materials science group of Prof. N.M. Harrison and in collaboration with Dr. B. Montanari (Rutherford Appleton Laboratory, Oxford) within the project: European Consortium **FERROCARBON** (<http://www.ferrocarbon.eu>).
- Electronic structure, magnetic long range order and spin dependent transport in graphitic ribbons.
- Room temperature ferromagnetism and spin polarised transport in gaphene by means of defects, vacancies and doping.
- Room temperature ferromagnetism in metal-organic materials ( V(TCNE)-2 ).

### J. W. Goethe University, Frankfurt

Sep.'03-Nov.'05

#### Post-doctoral Research Associate

- Structural, electronic, vibrational and magnetic properties of novel transition-metal oxyhalides via *Density Functional Theory* (relevant to high-temperature *Superconductivity*), in collaboration with Prof. R. Valenti.
- Anomalous spin-Peierls transition, Raman and infrared phonon spectra and interplay between orbital, lattice, spin degrees of freedom.

- Interpretation of angle-resolved photoemission spectra in collaboration with Prof. R. Claessen (University of Wuerzburg).
- *First-principles* study of magnetically doped spinel semiconductors and their possible application to *Spintronics*.

**University of Camerino, Camerino, Italy**

**Feb.'03-Jul.'03**

*Post-doctoral Research Associate*

- *BCS-BEC crossover* for a system of trapped Fermi atoms above and below the superfluid critical temperature, in collaboration with Prof. G. C. Strinati, Dr. P. Pieri and Dr. A. Perali.

**Military Service, Rome**

**Jun.'99-Mar.'00**

*Army Corporal*

## EDUCATION

**University of Camerino, Italy**

**Apr.'00-Jul.'03**

*PhD in Physics*

- Pairing fluctuation effects on the single-particle spectra below the superconducting critical temperature across the *BCS-BEC crossover*. Supervisor Prof. G. C. Strinati and Dr. P. Pieri.
- Built, tested and optimised FORTRAN code to generate the single-particle spectral function and thermodynamic parameters.
- Developed analytical representations of the spectral function in the strong coupling limit as a benchmark for testing and as an aid for the interpretation of experimental spectra.
- Comparison of spectral features with experimental data for high-temperature superconductors.

**University of Bologna, Italy**

**Oct.'92- Oct.'98**

*Laurea in Physics, final mark: 110/110 cum laude, corresponding to a M. Sc. with Distinction*

Thesis: Phase diagram of the Hubbard model in the strong coupling limit (t-J model).

## TECHNICAL SKILLS

**Modern languages:** Fluent in English, mother tongue Italian.

**Programming:** Good level in C++ and FORTRAN, basics of bash scripting.

**Operating Systems:** Linux and Windows.

**Development/Productivity Tools:** Mathematica, Microsoft Office applications, Xmgrace, Gnuplot, Latex.

**Computational Materials Science packages:** familiar with WIEN2k (Vienna), CRYSTAL (Daresbury-Turin) and CASTEP (Cambridge).

## TEACHING AND SUPERVISING EXPERIENCE

- supervision of a PhD student at Imperial College (2006-2007) within the project: "Room temperature ferromagnetism in organic and metal-organic materials"
- supervision of a 3rd year undergraduate student for the Literature B.Sc. projects on Intercalated graphite (March-June 2007) at Imperial College.
- supervision of 3rd year undergraduate student for the Literature B.Sc. projects on Spintronics (January-March 2007).
- MRes and 4th year students - Autumn Term 2006, Chemistry Dept. - Lecture on Magnetism and Spin-Density Functional Theory.
- 2nd year Undergraduate - Autumn Term 2006, Chemistry Dept. - Problem Class -Theoretical methods in chemistry: LCAO Theory of Ethene and Butadiene.
- 2nd year Undergraduate - Spring Term 2005, Chemistry Dept. - Computational Laboratory, Module: "The Free Energy and Thermal Expansion of MgO"

- 2nd year Undergraduate - Spring Term 2005, Chemistry Dept. - Problem Class: theoretical methods in chemistry: sequences, series, Morse potential, harmonic approximation, vibrational modes.
- Problems in quantum mechanics at the Institute for Theoretical Physics, Frankfurt am Main (3 rd year Undergraduate, Winter Term 2004)

## CONFERENCES and WORKSHOPS

- "Condensed Matter and Materials Physics (CMMP07)", 12 - 13 April 2007, University of Leicester, UK. Poster:"Ferromagnetism in graphitic ribbons"
- "Korrelationstage 2007", 26 Feb.-2 March 2007, Max-Planck-Institut fuer Physik komplexer Systeme, Dresden, Germany. Oral contribution:"Ab-initio phonons in the Spin-Peierls phase of TiOCl"
- Annual IoP Condensed Matter Theory group meeting, University of Warwick, 19 December 2006. Poster:"Ferromagnetism in graphitic ribbons"
- "Computational Magnetism", 13 December 2006, The Institute of Physics, London.
- "CRIM06: Current research in magnetism 2006", 8 December 2006, London, Imperial College London.
- "Theoretical and Experimental Magnetism Meeting", 3-4 August 2006, Cosener's House, Abingdon, UK. Poster contribution: "Ferromagnetism in only-carbon structures".
- "14th European Conference on Mathematics for Industry" ,10-14 July 2006, Madrid. Oral contribution:" Ferromagnetism in graphitic systems".
- "Topics in Nano-Magnetism", 30 November 2005, Daresbury, UK organised by Prof. W. Temmerman, Dr W. Hofer, Dr A. Wander and Prof. N. Harrison.
- "Toward atomistic materials design",  $\Psi$ k Conference, 17-21 September, 2005, Schwaebisch Gmuend, Germany. Poster Contribution: "Ab-initio phonons for the layered compound TiOCl".
- Spring Meeting of the Condensed Matter Division of the German Physical Society, DPG, Berlin (4-9 March, 2005). Poster Contribution: "Ab-initio phonons for the layered compound TiOCl".
- International workshop on "Collective quantum states in low-dimensional transition metal oxides", 22-25 Feb.2005, Max Planck Insitut fuer Physik Komplexer, Dresden (Germany).
- "Field Theory of Quantum Coherence, Correlations, and Mesoscopics", III Windsor Summer School, Windsor (Lancaster University, UK), 9-22 August 2004. Poster contribution: "BCS-BEC crossover at finite temperature for superfluid trapped Fermi atoms".
- XI National School of the Physics of Condensed Matter "Stati elettronici in metalli superconduttori" Sep. 2000, I.S.I. Foundation (Institute for Scientific Interchange), Villa Gualino, (Turin, Italy).

## GRANTS

- "Room temperature ferromagnetism in organic and metal-organic materials", 3-year PhD position at the Chemistry Department, Imperial College London (Nov. 2006).
- "Combined optical and magnetic response of a polymer semiconductor", B.Sc. and M.Sc. projects at the Chemistry Department, Imperial College London (2006/2007).

## PROFESSIONAL QUALIFICATIONS & MEMBERSHIPS

**Mar.'99-Jun.'99**                      Qualification to teach Mathematics in Secondary School.

**Nov.'05-Nov.'07**                      Referee of Physical Review B, Referee of Journal of Physics, Member of Institute of Physics, Member of American Physical Society

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## PUBLICATIONS

1. M. Dhariwal, L. Pisani, T. Maitra, "Competing electronic states in high temperature phase of NaTiO(2)", *J. Phys.: Condens. Matter* 26, 205501 (2014)
2. L. Pisani, B. Montanari, N. H. Harrison, "Stability of the ferromagnetic state in a mixed sp<sup>2</sup>-sp<sup>3</sup> carbon system", *Phys. Rev. B* 80, 104415 (2009)
3. G. C. de Fusco, L. Pisani, B. Montanari, N. H. Harrison, "Density functional study of the magnetic coupling in V(TCNE)-2 ", *Phys. Rev. B* 79, 8 (2009)
4. L. Pisani, B. Montanari, N. H. Harrison, "A defective graphene phase predicted to be a room temperature ferromagnetic semiconductor", *New Journal of Physics* 10, March (2008).
5. L. Pisani, R. Valenti, B. Montanari and N. M. Harrison, "Density functional study of the electronic and vibrational properties of TiOCl", *Phys. Rev. B.* 76, 235126 (2007)
6. M. Hoinkis, M. Sing, S. Glawion, L. Pisani, R. Valenti, S. van Smaalen, M. Klemm, S. Horn, and R. Claessen, "One-dimensional versus two-dimensional correlation effects in the oxyhalides TiOCl and TiOBr", *Phys. Rev. B* 75, 245124 (2007)
7. L. Pisani, J. A. Chan, B. Montanari, N. H. Harrison, "Electronic structure and magnetic properties of graphitic ribbons", *Phys. Rev. B.* 75, 064418 (2007)
8. L. Pisani, T. Maitra, and R. Valenti: "Effects of Fe substitution on the electronic, transport, and magnetic properties of ZnGa<sub>2</sub>O<sub>4</sub>: A systematic ab-initio study", *Phys. Rev. B*, 73, 205204 (2006)
9. M. Sing, M. Hoinkis, J. Schaefer, M. Klemm, S. Horn, H. Benthien, E. Jeckelmann, L. Pisani, R. Valenti, and R. Claessen: "Electronic structure and fluctuation effects in the spin-1/2 quantum magnet TiOCl", *J. de Physique IV* 131, 331 (2005)
10. M. Hoinkis, M. Sing, J. Schaefer, M. Klemm, S. Horn, H. Benthien, E. Jeckelmann, T.Saha Dasgupta, L. Pisani, R. Valenti, and R. Claessen: "Electronic structure of the spin-1/2 quantum magnet TiOCl", *Phys. Rev. B*, 72, 125127 (2005)
11. P. Pieri, L. Pisani, and G. C. Strinati: "Comparison between a diagrammatic theory for the BCS-BEC crossover and quantum Monte Carlo results", *Phys. Rev. B*, 73, 0125127 (2005)
12. L. Pisani and R. Valenti: " Ab initio phonon calculations for the layered compound TiOCl", *Phys. Rev. B*, 71 , 180409(R) (2004)
13. A. Perali, P. Pieri, L. Pisani, and G. C. Strinati: "BCS-BEC Crossover at Finite Temperature for Superfluid Trapped Fermi Atoms", *Phys. Rev. Lett.*, 92, 220404 (2004)
14. P. Pieri, L. Pisani, G. C. Strinati and A. Perali: "Single-particle spectra and magnetic field effects within precursor superconductivity", *PHYSICA C* 408, 317 (2004)
15. P. Pieri, L. Pisani, and G. C. Strinati: "Pairing Fluctuation Effects on the Single-Particle Spectra for the Superconducting State", *Phys. Rev. Lett.*, 92, 110401 (2004)
16. P. Pieri, L. Pisani, and G. C. Strinati: "BCS-BEC crossover at finite temperature in the broken-symmetry phase", *Phys. Rev. B*, 70, 094508 (2004)
17. E. Ercolessi., G. Morandi, L. Pisani and M. Roncaglia: "Mixed phases for the t-J model", *PHYSICA C* 331, 178 (2000)