

## CURRICULUM VITAE (August 2015)

### SANDRO STRINGARI

Born in Italy on March 2nd, 1949

Married with two daughters. Italian citizenship

### EDUCATION, MAIN APPOINTMENTS AND AWARDS

1972	Laurea in Physics cum laude, Università di Pisa and Scuola Normale Superiore
1972/1973	Fellowship, Scuola Normale Superiore
1973-1976	Research assistant, Università di Trento
1976	Visiting scientist, Department of Theoretical Physics, Oxford (6 months)
1976-1980	Assistant professor, Università di Trento
1978/1979	CNRS visiting scientist, Institute de Physique Nucleaire, Orsay
1980-1990	Associate professor, Università di Trento
1985/1986	CNRS visiting scientist, Institute de Physique Nucleaire, Orsay
1990	Visiting scientist, Laue-Langevin Institute, Grenoble (1 month)
1990	Full professor, Università di Trento
2002	M.T. Messori Roncaglia and E. Mari Prize, Accademia Nazionale dei Lincei
2002	Visiting professor, Ecole Normale Supérieure, Paris (1 month)
2004/2005	European Chair, College de France, Paris
2007	Visiting professor, Institut Henri Poincaré, Paris (1 month)
2008	Visiting professor, Center for Ultracold Atoms, MIT-Harvard (2 months)
2010	Winner of the ERC Advanced Grant “Quantum Gases beyond equilibrium”
2011	Member (Socio corrispondente) of the Accademia Nazionale dei Lincei
2013	Visiting professor, KITP Sta Barbara (1 month)
2013	College de France , Paris (1 month)

### ORGANIZATION ACTIVITIES (selection)

1992-1995	Chairman of the Physics Department, Università di Trento
1996/1997	Vice-Rector of the Università di Trento
1996-2000	National coordinator of the INFM Project "Experimental and Theoretical Investigation of Bose-Einstein Condensation in Alkali Atoms"
2002-2010	Director of the INFM Research and Development BEC Center
2006-2010	Member of the Evaluation Committee of the Institut Francilien de Recherche sur Les Atomes Froids (IFRAF)
2008-	Member of the Scientific Board of the Institute for Quantum Optics and Quantum Information (IQOQI) Austrian Academy of Sciences)
2009-2010	Dean of the Faculty of Mathematical, Physical and Natural Sciences, Trento
2010-2014	Member of the Scientific Committee of the Institut de Physique of CNRS
2012-2013	Member of the National Committee for the “Abilitazione” of associate and full Professors
2014-	Member of the Scientific Advisory Board of European Laboratory for Non-Linear Spectroscopy (LENS)

Sandro Stringari has also been member of the Editorial Board of several international scientific journals, including Journal of Low Temperature Physics, Physical Review A, Physical Review Letters and Journal of Statistical Physics.

### ORGANIZATION OF CONFERENCES AND SCHOOLS (selection)

- 1982 Trieste, ICTP (11-15/10), International Meeting on **Nuclear Fluid Dynamics** with M. Di Toro and M. Rosina
- 1988 Torino, Villa Gualino (20-26/6), Conference on **Spin Polarized Quantum Systems** with G. Frossati, F. Laloe and J. Walraven
- 1991 Marciana Marina, (19-29/6), Int. School on **Quantum Solids, Liquids and Gases** with S. Balibar
- 1993 Levico Terme, Trento (31/5-4/6), Int. Workshop on **Bose Einstein Condensation** with G. Baym, A. Griffin, F. Laloe, L. Pitaevskii and D. Snoke
- 1998 Varenna (2-17/7), E. Fermi School on **Bose-Einstein condensation in atomic gases** with M. Inguscio and C. Wieman
- 2000 Trento ECT\* (10-13/6), Workshop on **Rotating Bose-Einstein Condensates** with B. Mottelson
- 2002 Trento ECT\* (1/7-8/8), Summer Programme on **Bose-Einstein Condensation** with Ch. Clark and F. Laloe
- 2004 Levico Terme, Trento (4-6/3), Workshop on **Ultracold Fermi Gases** with R. Combescot and Ch. Salomon (ENS Paris)
- 2008 Levico Terme, Trento (3-5/4), Workshop on **Coherence, squeezing and entanglement for precision measurements with quantum gases** with A. Aspect, M. Inguscio, W. Phillips and A. Smerzi
- 2009 Trento ECT\* , PhD Training Programme on **Strongly Correlated Quantum Systems** with G. Baym and Ch. Pethick
- 2010 Trento ECT\* (12-14/4), Workshop on **New Frontiers in Graphene Physics** with I. Carusotto, S. Hands, A. Richter and B. Trauzettel
- 2011 Toronto (13-14/5) GriffinFest, Workshop in honour of **Allan Griffin** with J. Ho., E. Zaremba and J. Thywissen
- 2011 Trieste ICTP (6-10/6) Workshop on **Frontiers in Ultracold Fermi Gases** with W. Ketterle, M. Koehl, G. Mussardo, S. Stringari, and A. Trombettoni
- 2013 Trento UNITN (1-12/7) Summer Programme **Synthetic Gauge Fields for Atoms and Photons** with I. Carusotto, N. Cooper and J. Dalibard
- 2014 Varenna E. Fermi School on **Quantum Matter at Ultracold Temperatures** with M. Inguscio and W. Ketterle
- 2015 Trento ECT\*(22-25/6) Workshop on Cold Atoms meet High Energy Physics” with Massimo Inguscio and Guido Martinelli

I have been a member of Advisory and Steering Committees of important international conferences in the field of atomic and statistical physics, e.g., International Conference on Statistical Mechanics, International Conference on Quantum and Solids, International Conference on Bose-Einstein Condensation.

## RESEARCH FUNDING

Since 1996 I have been principal investigator of several national (INFM - Istituto Nazionale per la Fisica della Materia, CNR – Consiglio Nazionale delle Ricerche, MIUR - Ministry of Research and Education) and European research contracts related the physics of ultracold atomic gases. Recent research grants:

2010-2012 I was responsible for a start-up funding of 1410 kEuro, based on a joint 3-year agreement between the Province of Trento and CNR, aimed to support the growth of a new experimental activity on ultracold atomic gases at the Trento BEC Center.

2011-2016 I am the Principal Investigator of the 5-year QGBE (Quantum Gases Beyond Equilibrium) ERC 2010 Advanced Grant, supporting the theory activity of the Trento BEC team (1638.560 Euro).

2015-2017 I am the Trento coordinator of the European H2000-FETPROACT-2014 program

on Quantum simulations of insulators and conductors (QUIC), aimed to reinforce the experimental activity at the Trento BEC Center (510 KEuro)

## SELECTED PUBLICATIONS

**Superstripes and the excitation spectrum of a spin-orbit coupled Bose-Einstein condensed gas** Y. Li, G. Martone, L.Pitaevskii and S.Stringari, Phys. Rev. Lett. 110, 235302 (2013)

**Second sound and the superfluid fraction in a resonantly interacting Fermi gas** L.A.Sidorenkov, M.Khoon Tey, R.Grimm, Yan-Hua Hou, L.Pitaevskii, S.Stringari, Nature **498**, 78 (2013)

**Quantum tri-criticality and phase transitions in spin-orbit coupled Bose-Einstein condensates** Yun Li, Lev P. Pitaevskii, and Sandro Stringari, Phys. Rev. Lett. 108, 225301 (2012)

**Theory of ultracold atomic Fermi gases**  
Stefano Giorgini, Lev P. Pitaevskii, Sandro Stringari,  
Reviews of Modern Physics 80, 1215 (2008)

**Measurement of the Temperature Dependence of the Casimir-Polder Force**  
J.M. Obrecht, R.J. Wild, M. Antezza, L.P. Pitaevskii, S. Stringari, E.A. Cornell,  
Phys. Rev. Lett. 98, 063201 (2007)

**Normal state of a polarized Fermi gas at unitarity**  
C. Lobo, A. Recati, S. Giorgini, S. Stringari,  
Phys. Rev. Lett. 97, 200403 (2006)

**Expansion of an interacting Fermi gas**  
C. Menotti, P. Pedri and S. Stringari,  
Phys. Rev. Lett. 89, 250402 (2002)

**Theory of Bose-Einstein condensation in trapped gases**  
F. Dalfovo, S. Giorgini, L.P. Pitaevskii and S. Stringari,  
Reviews of Modern Physics 71, 463 (1999)

**Dynamic response of a Bose-Einstein condensate to a discontinuous change in internal state**  
M.R. Matthews, D.S. Hall, D.S. Jin, J.N. Ensher, C.E. Wieman, E.A. Cornell, F. Dalfovo, C. Minniti and S. Stringari, Phys. Rev. Lett. 81, 243 (1998)

**Collective Excitations of a trapped Bose-Condensed gas**  
S. Stringari, Phys. Rev. Lett. 77, 2360 (1996)

**Density of States and Evaporation Rate of Helium Clusters**  
D.M. Brink and S. Stringari, Zeit. Physik D 16, 257 (1990)

**Sum Rules and Giant Resonances in nuclei**  
E. Lipparini and S. Stringari, Phys. Rep. 175, 103 (1989)

## BOOKS

### **Bose-Einstein Condensation and Superfluidity**

Lev Pitaevskii and Sandro Stringari,  
Oxford University Press, to appear in January 2016.

### **Bose-Einstein Condensation**

Lev Pitaevskii and Sandro Stringari,  
Oxford University Press, Int. Series of Monographs on Physics, Clarendon Press 2003.

## MAIN EDITED BOOKS

### **Quantum Matter at Ultracold Temperatures**

Proceedings of the 2014 E. Fermi Summer School held in Varenna, M. Inguscio, W. Ketterle and S. Stringari eds (IOS Press, to be published)

### **Bose Einstein Condensation in atomic gases**

Proceedings of the 1998 E. Fermi Summer School held in Varenna, M. Inguscio, S. Stringari and C. Weiman eds. (IOS Press, Amsterdam, 1999)

### **Bose-Einstein Condensation**

Proceedings of the International Workshop held in Levico Terme, A. Griffin, D. Snoke and S. Stringari (Cambridge University Press, 1995)

## INVITED TALKS AT CONFERENCES AND WORKHOPS (selection, since 2000)

2000 Workshop on “Quantum degeneracy in trapped gases”, Gif sur Yvette

2000 ICAP 17<sup>th</sup>, Florence (Italy)

2001 Meeting on “Beyond BEC”, Harvard-Mit

2002 Workshop on “Atom Optics and Interferometry”, Lunteren, Netherlands

2003 Workshop on “Quantum Optics”, Obergurgl, Austria

2003 Symposium on “Quantum Challenges”, Warsaw

2003 ESF BEC Conference, St Feliu (Spain)

2004 Conference on “Frontiers in Quantum Gases”, Santa Barbara, USA

2004 UKCAN Conference, St Andrews (Great Britain)

2004 Workshop on Mesoscopic Phenomena in Ultracold Matter, Dresden

2005 LPHYS 14<sup>th</sup>, Kyoto (Japan)

2005 EPS 13 Conference “Beyond Einstein: Physics of the 21st Century”, Bern, Switzerland

2005 ESF BEC Conference, St. Feliu, Spain

2006 Workshop on “Strong Correlations in Ultra-Cold Fermi Systems”, Aspen, USA

2006 ESF INSTANS Conference, Como, Italy

2006 Workshop on “Current Development in Quantum Gases”, Beijing

2007 Workshop on “Superfluids under rotation”, Jerusalem, Israel

2007 Workshop on “Quantum Gases”, Institut Poincaré, Paris 23-4/22-7 2007)

2008 Latsis Symposium, Lausanne, Switzerland

2008 Landau Memorial Conference, Chernogolovka, Russia

2008 EMMI workshop on “Quark-Gluon-Plasma meets Cold Atoms”, Darmstadt (Germany)

2008 Conference on “Frontiers of Degenerate Quantum Gases”, Beijing,

2009 Workshop on Bloch Oscillations and Landau-Zener Tunneling, Dresden, Germany

2009 Conference on “Research Frontiers in Ultra-Cold Atoms”, Trieste, Italy

2009 LPHYS 18<sup>th</sup>, Barcelona, Spain

2009 Conference on “Recent progress in many body theories” RPMBT 15<sup>th</sup>, Columbus, USA

2009 BEC Conference, St. Feliu, Spain  
 2010 Conference “New Spin”, Utrecht, Netherlands  
 2010 Conference “Quo Vadis BEC”, Dresden, Germany  
 2010 Workshop on “Cold Quantum Matter”, Ischgl, Austria  
 2010 Conference on “Frontiers of Ultracold Atoms and Molecules”, Santa Barbara, USA  
 2011 INT Program on “Fermions from Cold Atoms to Neutron Stars”, Seattle, USA  
 2011 DAMOP Meeting, Atlanta, USA  
 2012 Conference on “Theory of Quantum Gases and Quantum Coherence”, Lyon, France  
 2012 Workshop on Quantum Simulations, ICTP Trieste  
 2012 Conference on Frontiers of Cold Atoms, Honk Kong  
 2012 EGAS 2012, Gothenburg, Sweden  
 2012 Aspen, USA  
 2012 Conference on Quo Vadis Bec, Bad Honef, Germany  
 2013 Conference on “Universal Themes of Bose-Einstein Condensation, Leiden, Netherlands  
 2013 Conference “New Spin 3”, Mainz, Germany  
 2013 YAO Conference, Birmingham, UK  
 2014 Orsay, Meeting in Memory of Oriol Bohigas  
 2014 ICAP, Washington  
 2014 Conference on Quantum Gases, Tsinghua University, China  
 2015 OPTICA2015, Beograd  
 2015 BEC Conference, St. Feliu  
 2015 Conf. on Topological Phases in Condensed Matter and Cold Atomic Systems, Hong-Kong

#### **LECTURES AT INTERNATIONAL SCHOOLS (since 2000)**

2000 School on “Bose-Einstein condensates and atom lasers”, Cargese, France  
 2003 School on “Quantum Gases in Low Dimensions”, Les Houches, France  
 2006 Enrico Fermi School on “Ultracold Fermi gases” Varenna, Italy  
 2007 Summer School on “Bose-Einstein Condensation”, Crete, Greece  
 2008 Enrico Fermi School on “Quantum Coherence in Solid State Systems”, Varenna, Italy  
 2010 Summer School on “Many-Body Physics with ultracold atoms”, Les Houches, France  
 2013 School on BEC, Chlef, Algeria  
 2013 School on Many-Body Physics and Cold Atoms, Les Houches

#### **MAIN PRESENT SCIENTIFIC INTERESTS**

- Theory of atomic quantum gases
- Elementary excitations in quantum many-body systems
- Bose-Einstein condensation and Fermi superfluidity

#### **SHORT DESCRIPTION OF THE SCIENTIFIC ACTIVITY**

After the studies at the University of Pisa and at the Scuola Normale Superiore Pisa (thesis on the Ising Model under the supervision of Bruno Touscheck), I started my career in **nuclear physics**, under the supervision of Renzo Leonardi in Trento and David Brink in Oxford, focusing on the collective excitations, magnetic properties and the isospin degree of freedom. The years spent at Orsay in 1978/79 and 1985/86 strengthened new collaborations with the team of Oriol Bohigas and Jacques Treiner at IPN. Significant contributions of this period dealt with the development of the **sum rule** approach to the many-body problem. On this subject, I published a review article in Physics Reports in 1989 in collaboration with Enrico Lipparini. Starting from 1984, I oriented my interests in the direction of **atomic clusters** and **quantum**

**liquids.** This new direction was inspired by the deep analogies existing between atomic nuclei and quantum fluids and was strongly favoured by fruitful collaborations with Franck Laloe at the ENS-Paris, who introduced me into the field of spin polarized atomic gases and in the community of atomic physics, and soon later with Lev Pitaevskii from the Kapitza Institute in Moscow with whom I started stimulating collaborations on quantum statistical physics and the theory of superfluidity.

My interests in the physics of **Bose-Einstein condensates** started with the conference on Bose-Einstein condensation, known as the “Levico conference” that I organized in 1993 together with Gordon Baym, Allan Griffin, Franck Laloe, Lev Pitaevskii and David Snoke. At the Les Houches workshop, held in March 1996, only a few months after the first realization of BEC, I presented the formalism of superfluid hydrodynamics to describe the **collective oscillations** of a trapped BEC, providing analytic predictions for their frequencies. This highly cited paper had a major impact on the first generation of experiments on the dynamics of BECs performed at JILA and MIT and influenced an important line of theoretical and experimental work. The hydrodynamic theory was later used by the Trento team to study the effects of a sudden change of the scattering length on the expansion of a condensate, measured within a joint collaboration with Eric Cornell, and the collective oscillations in low dimensional configurations including the transition to the Tonks-Girardeau regime, measured by Tilman Esslinger and more recently by Rudolph Grimm.

Soon after the first realization of BEC, I investigated, in collaboration with Stefano Giorgini and Lev Pitaevskii, the thermodynamic properties of trapped gases and in particular the shift of the **critical temperature** of a trapped BEC caused by the interactions. For positive scattering lengths the shift is negative. Experiments carried out by Alain Aspect in Orsay, and more recently by Zoran Hadzibabic in Cambridge, confirmed the correctness of our predictions for the shift on a quantitative basis, while it was later understood that the positive correction predicted by many-body theories of uniform matter enters the shift in a harmonically trapped gas only through higher order corrections. My interest in the **rotational properties** started just after the first BEC experimental realization, when, in collaboration with Franco Dalfovo, I provided a systematic description of the solutions of the Gross-Pitaevskii equation for the ground state as well as for **quantized vortices** in the presence of harmonic trapping. In a second series of papers, I focused more systematically my attention on the problem of rotating BECs. The measurements done by Jean Dalibard at ENS-Paris and Eric Cornell at JILA, aimed to determine the angular momentum of vortical configurations, were directly inspired by my work on the splitting of the quadrupole oscillations caused by vortices. Another successful work concerned the **scissors** mode, in collaboration with David Guery-Odelin. Our predictions were soon confirmed by the team of Chris Foot in Oxford, providing new insight on the quenching of the moment of inertia due to superfluidity. The scissors mode was more recently observed also in Fermi gases by the Rudolph Grimm. Within a NIST-Trento collaboration in 2001 we predicted the effects of irrotationality on the **expansion of a rotating superfluid gas**. The experiment was done by Chris Foot in BEC and, more recently, by John Thomas in a Fermi gas. In the same years, I predicted the **spontaneous breaking of rotational symmetry** in a rotating BEC. This effect was observed by Jean Dalibard, opening new routes to the study of the nucleation of quantized vortices. More exotic vortical configurations, including the **annular geometry**, were the object of a series of papers published in collaboration with Alexander Fetter, Marco Cozzini and Brian Jackson.

In the same period (1999-2001), in collaboration with Lev Pitaevskii, I devoted my attention also to the effects of **interference in momentum space** between two BECs and to the competition between **thermal and quantum fluctuations** in a double-well geometry. Our paper stimulated a first experiment at MIT on interference in momentum space, providing an *in situ*, nondestructive alternative to the more traditional studies of interference in real space, in the overlap of two expanding BECs. The thermal fluctuations were instead measured by the team of Markus Oberthaler in Heidelberg. In another paper, we proposed a method, based on Bragg spectroscopy, to measure directly the **Bogoliubov quasi-particle amplitudes** characterizing the

most famous Bogoliubov transformations of particles into quasi-particles in weakly interacting gas. The experiment was later successfully carried out by at Wolfgang Ketterle at MIT.

The study of **Fermi superfluids** is one of the recent directions of my scientific activity. It started with a collaboration with Chiara Menotti and Paolo Pedri in 2002, where we predicted that the **expansion** of a superfluid Fermi gas should follow the laws of superfluid hydrodynamics. This idea had soon an immediate impact in the community and stimulated a series of experiments on the expansion of ultracold Fermi gases along the BCS-BEC crossover, starting from the John Thomas' paper published in the same year. The investigation of collective oscillations of superfluid Fermi gases started in 2004 when I published a paper predicting the **universal behaviour of the collective frequencies** of an harmonically trapped gas at unitarity and the intriguing non-monotonic behaviour of the frequencies along the **BEC-BCS crossover**, due to the Lee-Huang-Yang effect in the equation of state. These predictions were later confirmed by the high precision measurements of Grimm's team in Innsbruck.

In another paper, written in collaboration with Roland Combescot and Maxim Kagan, I predicted the **Landau's critical velocity** of a Fermi superfluid gas along the BCS-BEC crossover, showing that it is largest at unitarity. Our predictions were confirmed by the Ketterle's team using a moving optical lattice.

In 2006 I started a collaboration with Carlos Lobo, Alessio Recati and Stefano Giorgini on the consequences of **spin polarization** in trapped Fermi gases at unitarity. We predicted the value of the critical polarization, known as **Chandrasakher-Clogston limit**, clarifying the question whether a highly polarized Fermi gas can still be superfluid. Our predictions were in remarkable agreement with the MIT measurements extrapolated to  $T=0$ , as well as with the shape of the density profiles measured at MIT and at ENS. We also first introduced the idea that **impurities** behave like quasi-particles characterized by a binding energy, an effective mass and an effective trapping frequency. Our work stimulated the first measurements of the excitation frequencies of highly polarized Fermi performed by the teams of Martin Zwierlein at MIT and of Christophe Salomon at ENS.

A fruitful collaboration started in 2003 on the **Casimir-Polder force** acting on atoms close to a dielectric surface. The collaboration involved the PhD student Mauro Antezza, Lev Pitaevskii and the team of Eric Cornell at JILA. In Trento we first predicted the frequency shifts of the dipole oscillation of a BEC close to a dielectric substrate that were observed at JILA. We later predicted a new asymptotic behavior of the surface-atom force out of thermal equilibrium, providing the leading term of the force at large distances. This effect was confirmed experimentally in a joint JILA-Trento paper published in 2007.

In 2008, in collaboration with Edward Taylor and Allan Griffin (Toronto), I started studying the effects of trapping on the propagation of **second sound** in quantum gases. This activity has been further developed more recently, in collaboration with Lev Pitaevskii and the PhD student Yanhua Hou and has stimulated new experiments on the unitary Fermi gas in the team of Rudolph Grimm at Innsbruck. In particular the first evidence for the temperature dependence of the collective oscillations and for the propagation of second sound in strongly interacting Fermi gases was recently reported within a joint Innsbruck-Trento collaboration. With Tomoki Ozawa I investigated the propagation of second sound in 2D Bose gases, pointing out the consequences of the Berezinski-Kosterlitz-Thouless transition. A recent collaboration with Franco Dalfovo, Robin Scott and Lev Pitaevskii has focused on the propagation of **solitons** and their collisional properties along the BEC-BCS crossover. With Alessio Recati I started a collaboration on the collective oscillations in **dipolar quantum gases** interacting with anisotropic interactions. This activity is expected to further develop in view of the new experimental perspectives in the realization of quantum degenerate molecular configurations. Another promising line of research concerns the study of quantum mixtures and in particular the study of **Bose-Fermi quantum mixtures**, with special focus on the emergence of the counterflow dynamic instability. This research line is carried on in collaboration with Alessio Recati, as well as with colleagues of the LKB laboratory in Paris.

In 2011 I started a new line of research on **spin-orbit coupled Bose gases** in collaboration with

Yun Li, the PhD student Giovanni Martone and Lev Pitaevskii. This activity is mainly focusing on the dynamic and superfluid properties of these novel configurations. We have predicted a strong quenching of the collective frequencies in spin-orbit coupled Bose-Einstein gases, in agreement with recent experiments carried out by Jin-Yi Zhang in Hanui (China), and the occurrence of a peculiar rotonic structure, precursor of the stripe phase, that was recently experimentally identified by the Shuai Chen's team in Shanghai. Recent studies in this field concern the search for supersolid effects in the stripe phase and the behavior of supercurrents and their dynamic instability. In collaboration with David Papoular I recently started a collaboration on transport phenomena in the presence of **constrictions** and to **short-cut to adiabaticity** strategies applied to Bose and Fermi gases containing quantum defects. An even more recent line of research, carried out in collaboration with Lev Pitaevskii, Marek Tulytki and Alessio Recati concerns the study of vortical and solitonic configurations in **coherently rf coupled Bose-Einstein condensates**.

I am author of about 250 scientific papers, two of them published in Reviews of Modern Physics and 53 in Physical Review Letters. The 1999 review article on the **Theory of Bose-Einstein Condensation in Trapped Atomic Gases** is one the most cited papers in physics in the literature of quantum gases. Together with Lev Pitaevskii, I co-authored the book "Bose-Einstein Condensation", published by Oxford University Press in 2003. In the Fall 2015 a new version of the book, with the title

"Bose-Einstein Condensation and Superfluidity" will be published by the same Press.

According to ISI, my total number of citations, considering only the papers published after 1990, is about 10000, with one paper cited more than 3000 times and 10 papers cited between 100 and 1000 times.

In 2002, I succeeded in establishing in Trento the Center on Bose –Einstein Condensation (**BEC Center**, <http://bec.science.unitn.it>), founded by the Istituto Nazionale per la Fisica della Materia (INFN), and now part of CNR. The Center is playing an important role on the international scene, thanks to its scientific achievements and the valuable collaborations with the most important laboratories in the world. In addition to Lev Pitaevskii, one of the pioneers in the theory of quantum gases, the team involves a number of researchers covering a broad area of scientific activities. The Center has favoured the creation of a "school" for brilliant PhD students and postdocs, as well as the circulation in Trento of a large number of top level scientists active in the field of quantum gases. The BEC center now hosts also a new experimental activity on ultracold atomic gases. Our team in Trento has a strategic collaboration with the cold atom team at **LENS** in Florence. These collaborations started in 1995 within a joint national project sponsored by INFN, aimed to reinforce the Italian research in the field of ultracold atoms. The initiative was very successful and favoured the first observation of BEC in Italy. The collaborations between the two teams includes a wide field of topics, such as the expansion of an array of condensates, the insulating behaviour of Fermi gas in a periodic potential, Bloch oscillations and the study of the entropy exchange in a mixture of ultracold atoms. Together with the team of Florence we are now developing a new strategy of research aimed to explore, in cold atoms, physical phenomena of relevance for high energy physics.

Finally, an important event characterizing my scientific life in the last decade was the invitation to held, in the academic year 2004/05, the European Chair at the **College de France** in Paris. My visit in Paris strengthened and stimulated new interactions and collaborations with the colleagues of the Ecole Normale Supérieure.

A brief, but intense period of my research activity was also devoted to the study of an old debated question concerning the discovery of electromagnetism and the role played by the Italian jurist Gian Domenico Romagnosi. This research was stimulated by a fruitful interaction with the American physicist Rober R. Wilson (Cornell) and lead to the discovery of unknown documents, like a paper written by Romagnosi in 1801 describing 'an experiment on the action



of the galvanic fluid on magnetism' and the proof that he sent his manuscript to the Institute de France in the same year, i.e almost 20 years before the celebrated discovery of electromagnetism by Oersted. The results of these studies are summarized in the paper **Romagnosi and the discovery of electromagnetism**, S.Stringari and R.R. Wilson, Rend. Fis. Acc. Lincei **9**, 115 (2000).