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in Solids Condensation and Coherence in Condensed Matter *QED Coherence in Matter Towards Solid-State Quantum Repeaters* **Coherent Vibrational Dynamics Laser Spectroscopy** *Optical Coherence Tomography in Cardiovascular Research* Complexity from Microscopic to Macroscopic Scales: Coherence and Large Deviations **Atomic Coherence and Its Potential Applications Multinuclear Magnetic Resonance in Liquids and Solids — Chemical Applications** Coherence and Energy Transfer in Glasses From Atomic to Mesoscale Laser Light Scattering *Macroscopic Quantum Coherence and Quantum Computing Coherence and Correlation in Atomic Collisions* **Lasers and Masers Coherence and NMR Nanophysics: Coherence and Transport** Coherent Dynamics of Small Molecules in Rare Gas Crystals *Quantum Coherence Correlation and Decoherence in Semiconductor Nanostructures* Optical Coherence and Quantum Optics *COHERENCE STUDIES IN THE FIRST ELECTRONIC EXCITED SINGLET STATE OF SOLID NAPHTHALENE.. Coherence* **New Trends in Quantum Coherence and Nonlinear Optics Coherence in Thought and Action Solid State NMR** Nuclear Magnetic Resonance Coherence Transfer in a Homonuclear Two Spin-1/2 Solid-state System **Realistic Theory of Solid-State Qubits** *Laser Ultrasonics Techniques and Applications*

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Quantum coherence plays a crucial role in various forms of matter. The thriving field of quantum information as well as unconventional approaches to using mesoscopic systems in future optoelectronic devices provide the exciting background for this set of lectures. The lectures originate from the Schladming Winter Schools and are edited to address a broad readership ranging from the graduate student up to the senior scientist. The aim of this book is to present new results in rapidly developing fields of non-linear optics such as atomic coherence, magneto-optics of atomic media, Doppler-free spectroscopy, time-domain spectroscopy of dense atomic vapours, frequency comb spectroscopy and atom-surface interactions. The discovery of such coherent effects as coherent population trapping (CPT), electromagnetically induced transparency (EIT) and electromagnetically induced absorption (EIA) opened a new avenue for development in many fields of non-linear optics. Investigations during the last decade have shown many related new results and approaches in non-linear optics. These include non-linear magneto-optical processes (NMOP) in the context of high precision magnetometry, quantum

information storage and processing, magnetic resonance imaging and magnetic particle detection; the use of ultra-thin (nanometric length) atomic vapour cells in magneto-optical experiments, which show new peculiarities of both coherent effects and NMOP; the use of frequency and amplitude modulated laser beams for NMOP studies in atomic vapours with the aim of extending the range of ultra-precise magnetometers to stronger, particularly geomagnetic fields; application of the counter-propagating beam technique to reveal the Doppler free non-linear Faraday rotation signals, as a spectroscopic tool and for applications; enhanced nonlinearly due to atomic coherence in multi-state systems; experimental study of EIT in solids; the use of the phase stabilised frequency domain combs of femtosecond laser pulses for velocity selective optical pumping of atomic hyperfine levels, as a direct frequency comb spectroscopy; time-domain non-linear spectroscopy of dense atomic vapours; atom-surface interactions and laser induced adsorption and description of alkali atoms on the surface of solid materials for nanotechnology applications. The first book devoted to laser techniques in the generation and reception of ultrasonic waves in materials, Laser Ultrasonics: Techniques and Applications provides a full description of the state of the art in all fields involving both lasers and ultrasonics. This practical book focuses mainly on the possible applications of the techniques, yet th This comprehensive text describes the phenomenon of atomic coherence and the applications in several processes. Various sections have been written by eminent authors who have made extensive contributions in the field of quantum interference. Discussions a H. KLEINPOPPEN AND J. F. WILLIAMS It has only very recently become possible to study angular correlations and coherence effects in different

areas of atomic collision processes: These investigations have provided us with an analysis of experimental data in terms of scattering amplitudes and their phases, of target parameters such as orientation, alignment, and state multipoles, and also of coherence parameters (e. g. , the degree of coherence of excita tion). In this way the analysis of electron-photon, ion-photon, atom-photon, or electron-ion coincidences from electron-atom, ion-atom, or atom-atom collisional excitation has led to a breakthrough such that the above quantities represent most crucial and sensitive tests for theories of atomic collision processes. Similarly, the powerful (e, 2e) experiments (electron-electron coincidences from impact ionization of atoms) have attracted much attention where improved experimental studies and detailed theoretical description provide a wealth of information on either the col lisional ionization process or the atomic structure of the target atom. Interference effects, many-electron correlations, and energy and angular momen tum exchange between electrons in a Coulomb field playa decisive role in the under standing of postcollision interactions. New results on coherence effects and orienta tion and alignment in collisional processes of ions with surfaces and crystal lattices show links to relevant interference phenomena in atomic collisions. In small-angle elastic electron-atom scattering the effect of angular coherence can be studied in a crossed beam experiment. This volume presents the latest advancements and future developments of atomic, molecular and optical (AMO) physics and its vital role in modern sciences and technologies. The chapters are devoted to studies of a wide range of quantum systems, with an emphasis on understanding of quantum coherence and other quantum phenomena originated from light-matter interactions. The book intends to survey the

current research landscape and to highlight major scientific trends in AMO physics as well as those interfacing with interdisciplinary sciences. The volume may be particularly useful for young researchers working on establishing their scientific interests and goals. Contents:Collective Phenomena and Long-Range Interactions in Ultracold Atoms and Molecules:Quantum Magnetism with Ultracold Molecules (M L Wall, K R A Hazzard and A M Rey)Optical Manipulation of Light Scattering in Cold Atomic Rubidium (R G Olave, A L Win, K Kemp, S J Roof, S Balik, M D Havey, I M Sokolov and D V Kupriyanov)Seeing Spin Dynamics in Atomic Gases (D M Stamper-Kurn)Atom-like Coherent Solid State Systems:Precision Magnetic Sensing and Imaging Using NV-Diamond (R L Walsworth)Entanglement and Quantum Optics with Quantum Dots (A P Burgers, J R Schaibley and D G Steel)Coherent Nanophotonics and Plasmonics:Enhancement of Single-Photon Sources with Metamaterials (M Y Shalaginov, S Bogdanov, V V Vorobyov, A S Lagutchev, A V Kildishev, A V Akimov, A Boltassevaand V M Shalaev)Linear Optical Properties of Periodic Hybrid Materials at Oblique Incidence: A Numerical Approach (A Blake and M Sukharev)Fundamental Physics:An Introduction to Boson-Sampling (B T Gard, K R Motes, J P Olson, P P Rohde and J P Dowling)New Approach to Quantum Amplification by Superradiant Emission of Radiation (G Shchedrin, Y Rostovtsev, X Zhang and M O Scully)Ultrafast Dynamics in Strong Laser Fields:Circularly Polarized Attosecond Pulses and Molecular Atto-Magnetism (A D Bandrauk and K-J Yuan)Many-Electron Response of Gas-Phase Fullerene Materials to Ultraviolet and Soft X-ray Photons (H S Chakraborty and M Magrakvelidze)Ultracold Chemistry:Collisions and Reactions in Ultracold Gases (N Balakrishnan and J Hazra)

Readership: For professional researchers as well as young academics in the field of Atomic, Molecular and Optical (AMO) physics. Key Features:The contributors for this volume are all internationally recognized experts in their fieldsThis book offers a unique overview of the state of current AMO physics, while outlining future directions. No comparable titles have been identified so far (by editors or by reviewers)All contributions include new unpublished research, and will be of interest for anyone pursuing the scientific investigations in the presented areasKeywords:Quantum Coherence;Amo;Atomic Physics;Quantum Control;Ultracold Atoms;Ultracold Molecules;Nv-diamonds;Quantum Dots;Quantum Magnetism;Nanophotonics;Plasmonics;Ultrafast Dynamics;Ultracold Chemistry The developments of nanofabrication in the past years have enabled the design of electronic systems that exhibit spectacular signatures of quantum coherence. Nanofabricated quantum wires and dots containing a small number of electrons are ideal experimental playgrounds for probing electron-electron interactions and their interplay with disorder. Going down to even smaller scales, molecules such as carbon nanotubes, fullerenes or hydrogen molecules can now be inserted in nanocircuits. Measurements of transport through a single chain of atoms have been performed as well. Much progress has also been made in the design and fabrication of superconducting and hybrid nanostructures, be they normal/superconductor or ferromagnetic/superconductor. Quantum coherence is then no longer that of individual electronic states, but rather that of a superconducting wavefunction of a macroscopic number of Cooper pairs condensed in the same quantum mechanical state. Beyond the study of linear response regime, the physics of

non-equilibrium transport (including non-linear transport, rectification of a high frequency electric field as well as shot noise) has received much attention, with significant experimental and theoretical insights. All these quantities exhibit very specific signatures of the quantum nature of transport, which cannot be obtained from basic conductance measurements. Basic concepts and analytical tools needed to understand this new physics are presented in a series of theoretical fundamental courses, in parallel with more phenomenological ones where physics is discussed in a less formal way and illustrated by many experiments. · Electron-electron interactions in one-dimensional quantum transport · Coulomb Blockade and Kondo physics in quantum dots · Out of equilibrium noise and quantum transport · Andreev reflection and subgap nonlinear transport in hybrid N/S nanosructures. · Transport through atomic contacts · Solid state Q-bits · Written by leading experts in the field, both theorists and experimentalists This book presents a systematic account of optical coherence theory within the framework of classical optics, as applied to such topics as radiation from sources of different states of coherence, foundations of radiometry, effects of source coherence on the spectra of radiated fields, coherence theory of laser modes, and scattering of partially coherent light by random media. "This volume gives an overview of the manifestations of quantum coherence in different solid state systems, including semiconductor confined systems, magnetic systems, crystals and superconductors. Besides being of paramount importance in fundamental physics, the study of quantum coherence furnishes the starting point for important applications like quantum computing or secure data transmission. The coherent effects discussed mainly involve elementary excitations in solids like polaritons,

excitons, magnons, macroscopic quantities like superconductor currents and electron spins. Also, several new aspects of the physics of quasi-particles are understood and discussed in this context. Due to the variety of systems in which quantum coherence may be observed, solid state systems are the natural candidates for applications that rely on coherence, for example quantum computer." --Book Jacket. Laser Light Scattering: Basic Principles and Practice, Second Edition deals with the technical aspects of laser light scattering, including the basic principles and practice. Topics covered include light scattering theory, optical mixing spectrometry, photon correlation spectroscopy, and interferometry. Experimental methods and methods of data analysis are also described. This book is comprised of eight chapters and begins with a discussion on the interrelationship between laser light scattering and other types of scattering techniques that use X-rays and neutrons, with particular reference to momentum and energy transfers as well as time-averaged and time-dependent scattered intensity. The spectrum of scattered light and a single-particle approach to time-averaged scattered intensity are considered. The following chapters focus on photoelectric detection of the scattered electric field; optical mixing spectrometers; basic equations for photon correlation spectroscopy; and the principles of Fabry-Perot interferometry. The pertinent features of the experimental aspects of laser light scattering are also outlined, together with the Laplace inversion problem. The final chapter examines polymer molecular-weight distributions in relation to particle sizing. This monograph will be of interest to physicists. In 2001, the Nobel Foundation celebrated the 100th anniversary of the first Nobel Prize, and all previous Nobel laureates were invited to attend the Nobel ceremonies in Stockholm. This gave an excellent opportunity for

arranging jubilee symposia with topics that would attract several of the laureates. The chosen subject of ?Condensation and Coherence in Condensed Systems? attracted sixteen Nobel laureates and another thirty-five leading scientists.The idea was to bring scientists together from several related subdisciplines: atomic physics, quantum optics, and condensed matter physics, for cross-breeding of ideas, concepts, and experience. Subjects like phase transitions in strongly coupled systems, Bose-Einstein condensation in weakly coupled systems, macroscopic quantum phenomena, coherence in mesoscopic structures, and quantum information were intensively discussed from different points of view. Coherence phenomena in condensed systems were emphasized. A special session was devoted to the emerging field of quantum computing, with experimental and theoretical results reported for different types of qu-bits. The 2001 Nobel Prize awarded to Eric Cornell, Wolfgang Ketterle, and Carl Wieman, ?for the achievement of Bose-Einstein condensation in dilute gases of alkali atoms, and for early fundamental studies of the properties of the condensates,? gave an extra flavor to the theme of the Centennial Symposium.
Complex times call for clear solutions—If initiative overload and fragmentation are keeping your best plans from becoming reality, it’s time to start leading differently. The key to bringing about the kind of successful and sustainable change you need is the Coherence Framework, a dynamic, customizable road map made up of four essential components: Focused direction to build collective purpose Cultivating collaborative cultures while clarifying individual and team roles Deepening learning to accelerate improvement and foster innovation Securing accountability from the inside out Coherence provides the insights and tools to drive effective leadership. Now you

can gain a deeper understanding of Coherence with The Taking Action Guide to Building Coherence in Schools, Districts, and Systems. Coherence is a book that demands action – it moves from the narrative of fixing one teacher at a time, to asking about the coherence of the system (be it school, national, or world issues). Fullan and Quinn create an important narrative about direction, working together, deepening learning, and securing accountability. The book sparkles with examples of coherence in action, it makes no excuses for employing the wrong levers of change. This is the blueprint for a new vocabulary of education action; it shows where we need to go next, and is another example of Fullan at the top of his game. John Hattie Director, Melbourne Education Research Institute and Author of Visible Learning "School systems that struggle are riddled with incoherence—mismatched strategies, competing cultures, and illogical initiatives. Fullan and Quinn explain clearly how coherence can solve the problem. Based on solid research and lessons drawn from effective practice, Coherence provides a comprehensive model to guide educators as they learn and lead their way to better schools." Susan Moore Johnson Jerome T. Murphy Research Professor Harvard Graduate School of Education Quantum coherence plays a crucial role in various forms of matter. The thriving field of quantum information as well as unconventional approaches to using mesoscopic systems in future optoelectronic devices provide the exciting background for this set of lectures. The lectures originate from the Schladming Winter Schools and are edited to address a broad readership ranging from the graduate student up to the senior scientist. Up until now the dominant view of condensed matter physics has been that of an “electrostatic MECCANO” (erector set, for Americans). This book is the first systematic

attempt to consider the full quantum-electrodynamical interaction (QED), thus greatly enriching the possible dynamical mechanisms that operate in the construction of the wonderful variety of condensed matter systems, including life itself. A new paradigm is emerging, replacing the “electrostatic MECCANO” with an “electrodynamic NETWORK,” which builds condensed matter through the long range (as opposed to the “short range” nature of the usual electrostatic forces) electrodynamical interaction; this interaction creates “coherent configurations” of the elementary systems (atoms and molecules), which oscillate in phase with a coherent macroscopic (and classical) electromagnetic field that, through the strong interaction with matter, remains trapped inside it. Contents:Quantum Field Theory of Matter and RadiationThe Dynamics of QED in Condensed MatterQED of Two-Level SystemsQED Coherence in the Two Helium IsotopesQFT of Plasmas: Ideal and RealSuperconductivity, Cold and HotJoe Weber's PhysicsTowards a Theory of Cold Fusion PhenomenaQED Coherence in FerromagnetismDynamics and Thermodynamics of WaterA Far Reaching Analogy: QCD Coherence in Nuclear Matter Readership: Physicists, chemists and engineers. keywords: “I am quite happy to see the particular approach (from the University of Milan) to this subject summarized so nicely in Guiliano Preparata's book … We are fortunate that Guiliano Preparata has taken the time (away from his own research) to write about coherent QED effects in a clear and pedagogic manner … there is now in Guiliano Preparata's book a wealth of new ideas which should lead others along a fruitful research path.” Allan Widom Quantum Computation in Solid State Systems discusses experimental implementation of quantum computing for information processing devices; in particular observations of

quantum behavior in several solid state systems are presented. The complementary theoretical contributions provide models of minimizing decoherence in the different systems. Most recent theoretical and experimental results on macroscopic quantum coherence of mesoscopic systems, as well as the realization of solid-state qubits and quantum gates are discussed. Particular attention is given to coherence effects in Josephson devices. Other solid state systems---including quantum dots, optical, ion, and spin devices---are also discussed. This book presents an account of the course "Optical Properties of Excited States in Solids" held in Erice, Italy, from June 16 to 3D, 1991. This meeting was organized by the International School of Atomic and Molecular Spectroscopy of the "Ettore Majorana" Centre for Scientific Culture. The purpose of this course was to present physical models, mathematical formalisms and experimental techniques relevant to the optical properties of excited states in solids. Some active physical species, such as ions or radicals, could survive indefinitely if they were completely 'isolated in space. Other active species, such as excited molecular and solid-state systems, are inherently unstable, even in isolation, due to the spontaneous mechanisms that may convert their excitation energies into radiation or heat. Physical parameters that may be used to characterize these excited systems are the localization or delocalization, and the coherence or incoherence, of their state excitations. In solids the excited states, whether they are localized (as for impurities in insulators) or delocalized (as they may occur in semiconductors), are relevant in several regards. Their de-excitation is extremely sensitive to the nature of the excitations of the systems, and a study of the de-excitation processes can yield a variety of information. For example, the excited states may represent the initial condition of the

onset of such processes as Stokes-shifted emission, hot luminescence, symmetry-dependent Jahn-Teller and scattering processes, tunneling processes, energy transfer to like and unlike centers, superradiance, coherent radiation, and excited state absorption. Many mesoscopic systems display `adaptive' behaviour - changes in some physical property that results from a small change in an internal or external driving force. There is a kind of progression in adaptive phenomena, from quantum mesoscopics to complex, evolved cooperative systems and large scale events like turbulence. The field of mesoscopic magnetism, especially quantum coherence and quantum tunnelling in spin systems, and the coupling between mesoscopic magnetism and mesoscopic transport is currently a very active area of solid state physics. `Dephasing' is an important concept in mesoscopic systems like these. A basic question is the limit at which quantum mechanics breaks down and what it can be replaced with. Another interesting crossover is that between complexity and large excursions or events, with turbulence as a prototype example. The book also contains a discussion of finance. Qualitatively speaking, turbulence and financial markets are apparently similar, so our understanding of turbulence may be relevant to understanding price fluctuations. We have studied quantum coherence and control in solid-state qubits, mostly in superconductors. We have outlined several strategies to obtain high-fidelity quantum logic gates in the presence of decoherence. We have studied realistic, structured environments to qubits, including environments with resonances, slow noise, and non-Markovian effects. In all cases, we have formulated strategies how to master and engineer the decoherence properties. We have analyzed examples from superconducting charge and

flux qubits as well as quantum dots. Dipolar Recoupling, by Niels Chr. Nielsen, Lasse A. Strassø and Anders B. Nielsen.- Solid-State NMR Techniques for the Structural Determination of Amyloid Fibrils, by Jerry C. C. Chan.- Solid-State 19F-NMR of Peptides in Native Membranes, by Katja Koch, Sergii Afonin, Marco Ieronimo, Marina Berditsch and Anne S. Ulrich.- Probing Quadrupolar Nuclei by Solid-State NMR Spectroscopy: Recent Advances, by Christian Fernandez and Marek Pruski.- Solid State NMR of Porous Materials Zeolites and Related Materials, by Hubert Koller and Mark Weiß.- Solid-State NMR of Inorganic Semiconductors, by James P. Yesinowski.- Keeping abreast of the latest techniques and applications, this new edition of the standard reference and graduate text on laser spectroscopy has been completely revised and expanded. While the general concept is unchanged, the new edition features a broad array of new material, e.g., frequency doubling in external cavities, reliable cw-parametric oscillators, tunable narrow-band UV sources, more sensitive detection techniques, tunable femtosecond and sub-femtosecond lasers (X-ray region and the attosecond range), control of atomic and molecular excitations, frequency combs able to synchronize independent femtosecond lasers, coherent matter waves, and still more applications in chemical analysis, medical diagnostics, and engineering. Towards Solid-State Quantum Repeaters: Ultrafast, Coherent Optical Control and Spin-Photon Entanglement in Charged InAs Quantum Dots summarizes several state-of-the-art coherent spin manipulation experiments in III-V quantum dots. Both high-fidelity optical manipulation, decoherence due to nuclear spins and the spin coherence extraction are discussed, as is the generation of entanglement between a single spin qubit and a photonic qubit. The experimental results are

analyzed and discussed in the context of future quantum technologies, such as quantum repeaters. Single spins in optically active semiconductor host materials have emerged as leading candidates for quantum information processing (QIP). The quantum nature of the spin allows for encoding of stationary, memory quantum bits (qubits), and the relatively weak interaction with the host material preserves the spin coherence. On the other hand, optically active host materials permit direct interfacing with light, which can be used for all-optical qubit manipulation, and for efficiently mapping matter qubits into photonic qubits that are suited for long-distance quantum communication. In recent years the physics of disordered systems has been one of the most active and fruitful areas of research in condensed matter science. In contrast to the considerable attention paid by conferences, schools and workshops to the static and structural aspects of glasses, there has been no forum devoted primarily to the dynamic and energetic aspects of amorphous solids. The NATO Workshop on Coherence and Energy Transfer in Glasses was organized to address this deficiency. The intent was to bring together in an intense and interactive environment, experts in several rather disparate subfields relating to the dynamics and energetics of disordered systems. This volume represents the Proceedings of that Workshop, which took place in September 1982 at Clare College of Cambridge University. Forty-three scientists from eight NATO countries participated. These included representatives from universities and industrial laboratories, as well as government research institutions. The meeting was organized into eight formal sessions and one informal session devoted entirely to unstructured discussion. Each formal session featured two comprehensive lectures. An additional 60 to 90 minutes was devoted in each session to discussions and contributions related to the lectures. Since

only about 60% of the session time was devoted to formal presentations, the discussions formed an equally important part of the workshop. The chairmen and discussion leaders - as well as the workshop participants themselves - brought forth lively and illuminating discussions for each session. Places into perspective the role of quantum dynamics in NMR--addresses characterization of a system of particles with spin (or any other quantum mechanical property), how such a system changes with time, and broader applications to chemistry, physics, and other fields. Also ties together the various manifestations of NMR in solids and liquids--using as a common language the unitary transformation of a system's density operator under the Hamiltonian--revealing the underpinnings of what might be called manipulative NMR: experiments in which the time-dependent Schdinger equation is controlled externally in a non-trivial fashion. The Eighth Rochester Conference on Coherence and Quantum Optics was held on the campus of the University of Rochester during the period June 13-16,2001. This volume contains the proceedings of the meeting. The meeting was preceded by an affiliated conference, the International Conference on Quantum Information, with some overlapping sessions on June 13. The proceedings of the affiliated conference will be published separately by the Optical Society of America. A few papers that were presented in common plenary sessions of the two conferences will be published in both proceedings volumes. More than 268 scientists from 28 countries participated in the week long discussions and presentations. This Conference differed from the previous seven in the CQO series in several ways, the most important of which was the absence of Leonard Mandel. Professor Mandel died a few months before the conference. A special memorial symposium

in his honor was held at the end of the conference. The presentations from that symposium are included in this proceedings volume. An innovation, that we believe made an important contribution to the conference, was the inclusion of a series of invited lectures chaired by CQO founder Emil Wolf, reviewing the history of the fields of coherence and quantum optics before about 1970. These were given by three prominent participants in the development of the field, C. Cohen-Tannoudji, 1. F. Clauser, and R. I. Glauber. The fundamental concept of quantum coherence plays a central role in quantum physics, cutting across disciplines of quantum optics, atomic and condensed matter physics. Quantum coherence represents a universal property of the quantum s- tems that applies both to light and matter thereby tying together materials and p- nomena. Moreover, the optical coherence can be transferred to the medium through the light-matter interactions. Since the early days of quantum mechanics there has been a desire to control dynamics of quantum systems. The generation and c- trol of quantum coherence in matter by optical means, in particular, represents a viable way to achieve this longstanding goal and semiconductor nanostructures are the most promising candidates for controllable quantum systems. Optical generation and control of coherent light-matter states in semiconductor quantum nanostructures is precisely the scope of the present book. Recently, there has been a great deal of interest in the subject of quantum coh- ence. We are currently witnessing parallel growth of activities in different physical systems that are all built around the central concept of manipulation of quantum coherence. The burgeoning activities in solid-state systems, and semiconductors in particular, have been strongly driven by the unprecedented control of coherence that previously has

been demonstrated in quantum optics of atoms and molecules, and is now taking advantage of the remarkable advances in semiconductor fabrication technologies. A recent impetus to exploit the coherent quantum phenomena comes from the emergence of the quantum information paradigm. This volume is an outgrowth of the Second International Workshop on Macroscopic Quantum Coherence and Computing held in Napoli, Italy, in June 2000. This workshop gathered a number of experts from the major Universities and Research Institutions of several countries. The choice of the location, which recognizes the role and the traditions of Naples in this field, guaranteed the participants a stimulating atmosphere. The aim of the workshop has been to report on the recent theoretical and experimental results on the macroscopic quantum coherence of macroscopic systems. Particular attention was devoted to Josephson devices. The correlation with other atomic and molecular systems, exhibiting a macroscopic quantum behaviour, was also discussed. The seminars provided both historical overview and recent theoretical ground on the topic, as well as information on new experimental results relative to the quantum computing area. The first workshop on this topic, held in Napoli in 1998, has been ennobled by important reports on observations of Macroscopic Quantum Coherence in mesoscopic systems. The current workshop proposed, among many stimulating results, the first observations of Macroscopic Quantum Coherence between macroscopically distinct fluxoid states in rf SQUIDs, 20 years after the Leggett's proposal to experimentally test the quantum behavior of macroscopic systems. Reports on observations of quantum behaviour in molecular and magnetic systems, small Josephson devices, quantum dots have also been particularly stimulating in view

of the realization of several possible q-bits. Quantum Computation in Solid State Systems discusses experimental implementation of quantum computing for information processing devices; in particular observations of quantum behavior in several solid state systems are presented. The complementary theoretical contributions provide models of minimizing decoherence in the different systems. Most recent theoretical and experimental results on macroscopic quantum coherence of mesoscopic systems, as well as the realization of solid-state qubits and quantum gates are discussed. Particular attention is given to coherence effects in Josephson devices. Other solid state systems---including quantum dots, optical, ion, and spin devices---are also discussed. Remarkable developments in the spectroscopy field regarding ultrashort pulse generation have led to the possibility of producing light pulses ranging from 50 to5 fs and frequency tunable from the near infrared to the ultraviolet range. Such pulses enable us to follow the coupling of vibrational motion to the electronic transitions in molecules and solids in real time. Detailing these advanced developments, as well as the fundamental methods and tools of vibrational spectroscopy, Coherent Vibrational Dynamics providesresearchers and students with a uniquely comprehensive resource. With the contributions of pioneering scientists, this seminal volume – · Outlines the principles and tools used on time-domain vibrational spectroscopy and provides a general introduction to the subject of coherent phonons · Describes the modern methods for tunable ultrashort pulse generation from infrared to visible-UV · Reviews coherent vibrational dynamics in small molecules in liquids (hydrogen bonds), and in carbon based conjugated materials (polyenes, carotenoids, and semiconducting polymers) · Explores phonon dynamics in semiconductors (bulk and

heterostructures) and in quasi-one-dimensional systems Supplemented with a great number of references, and covering fundamental as well advanced topics, this text provides a valuable reference for both graduate students and senior researchers investigating materials in physics, chemistry, and biology. It is also an excellent starting point for those who want to pursue research in the field of ultrafast optics and spectroscopy. Given that for centuries, the standard tool to understand diseases in tissues was the microscope and that its major limitation was that only excised tissue could be used, recent technology now permits the examination of diseased tissue in vivo. Optical coherence tomography (OCT) has promising potential when applied to coronary artery disease. OCT has the capability to identify coronary plaque and to distinguish between plaques that are stable and unstable. If the plaques are stable then OCT can direct percutaneous intervention (angioplasty or stenting). Optical coherence tomography is a light-based imaging technology that allows for very high resolution imaging in biological tissues. It has been first applied in ophthalmology, where it soon became the golden standard for the assessment of (epi-) retinal processes. The unique imaging capabilities have raised the interest of researchers and clinicians in the field of cardiovascular disease, since OCT offers unique possibilities to study atherosclerosis pathophysiology in vivo. With over 1.1M Americans having a heart attack this year because of unstable plaque rupture, OCT may have an increasingly important role in the early diagnosis of coronary artery disease. This unique publication offers the reader the basic background to OCT and its role in the diagnosis and management of coronary artery disease. The Handbook of Optical Coherence Tomography in Cardiovascular Research introduces the cardiovascular application of

this technology. Clinicians, biologists, engineers and physicist are discussing different aspects of cardiovascular OCT application in a multidisciplinary approach. The handbook offers the readership a concise overview on the current state of the art of vascular OCT imaging and sheds light on a variety of exciting new developments. The physics, technical principles of OCT and its application in a broad spectrum of cardiovascular research areas are summarized by highly recognized specialists. The potential of OCT in peripheral and coronary arteries and in developmental cardiology are described. Each research area is introduced by a clinical expert in the field followed by discussion of different aspects from an engineering, biomedical and clinical perspective. Specifically, the current capabilities for plaque characterization, detection of vulnerable plaque, guidance of interventional procedures, Doppler-assessment, and molecular contrast imaging are being described. The Handbook of Optical Coherence Tomography in Cardiovascular Research targets researchers and clinicians involved in the field of atherosclerosis. The summary of basic physics, engineering solutions, pre-clinical and clinical application covers all relevant aspects and will be a valuable reference source. This book features the proceedings of the NATO Advanced Study Institute "Manipulating Quantum Coherence in Solid State Systems", held in Cluj-Napoca, Romania, August 2005, which presented a fundamental introduction to solid-state approaches to achieving quantum computation. This proceedings volume describes the properties of quantum coherence in semiconductor spin-based systems and the behavior of quantum coherence in superconducting systems. The idea of this NATO school was born during philosophical discussions with Dr Brevard on the present and future of NMR

during a night walk under the palm trees in Biskra during a seminar held in this oasis. It was clear for us that the recent progress in the field of NMR, especially inverse spectroscopy and the development of MAS, was opening new perspectives for chemists. We realised also that organometallic and inorganic chemists were not clearly informed about the potentialities of all the new methods. NA TO, with its summer schools, was offering a good opportunity to propose to the chemical community a session where those problems would be largely developped. This School is then the prolongation of the two previous ones: Palermo in 1976 on "the less receptive nuclei" and Stirling in 1982 on "the multinuclear approach to NMR spectroscopy" . It was divided into two sub-sessions: NMR in the liquid state and NMR in the solid state. This is reflected in the book organization. As indicated by the title of this School, we were mainly concerned with the methodological aspects of multinuclear NMR. If many examples are given, they appear only as a support for the understanding of the theory or in explanation of some practical aspects of the different experiments. Each domain is introduced by a lecture which presents selected examples. This book is an essay on how people make sense of each other and the world they live in. Making sense is the activity of fitting something puzzling into a coherent pattern of mental representations that include concepts, beliefs, goals, and actions. Paul Thagard proposes a general theory of coherence as the satisfaction of multiple interacting constraints, and discusses the theory's numerous psychological and philosophical applications. Much of human cognition can be understood in terms of coherence as constraint satisfaction, and many of the central problems of philosophy can be given coherence-based solutions. Thagard shows how coherence can help to unify psychology and philosophy,

particularly when addressing questions of epistemology, metaphysics, ethics, politics, and aesthetics. He also shows how coherence can integrate cognition and emotion. Semiconductor nanostructures are attracting a great deal of interest as the most promising device with which to implement quantum information processing and quantum computing. This book surveys the present status of nanofabrication techniques, near field spectroscopy and microscopy to assist the fabricated nanostructures. It will be essential reading for academic and industrial researchers in pure and applied physics, optics, semiconductors and microelectronics. The first up-to-date review articles on various aspects on quantum coherence, correlation and decoherence in semiconductor nanostructures

- Manipulating Quantum Coherence In Solid State Systems
- Quantum Coherence In Solid State Systems
- Quantum Coherence In Solid states And Its Application To Quantum Information Processing
- Optical Generation And Control Of Quantum Coherence In Semiconductor Nanostructures
- Quantum Computing In Solid State Systems
- Quantum Coherence
- Application Of Zero quantum Coherence And Transitions In Solid state NMR
- Quantum Computing In Solid State Systems
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- Optical Properties Of Excited States In Solids
- Condensation And Coherence In Condensed Matter
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Dynamics
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- Optical Coherence Tomography In Cardiovascular Research
- Complexity From Microscopic To Macroscopic Scales Coherence And Large Deviations
- Atomic Coherence And Its Potential Applications
- Multinuclear Magnetic Resonance In Liquids And Solids Chemical Applications
- Coherence And Energy Transfer In Glasses
- From Atomic To Mesoscale
- Laser Light Scattering
- Macroscopic Quantum Coherence And Quantum Computing
- Coherence And Correlation In Atomic Collisions
- Lasers And Masers
- Coherence And NMR
- Nanophysics Coherence And Transport
- Coherent Dynamics Of Small Molecules In Rare Gas Crystals
- Quantum Coherence Correlation And Decoherence In Semiconductor Nanostructures
- Optical Coherence And Quantum Optics
- COHERENCE STUDIES IN THE FIRST ELECTRONIC EXCITED SINGLET STATE OF SOLID NAPHTHALENE
- Coherence
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- Coherence In Thought And Action
- Solid State NMR
- Nuclear Magnetic Resonance Coherence Transfer In A Homonuclear Two Spin 1 2 Solid state System
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