ХРОНІКА, БІБЛІОҐРАФІЯ, ПЕРСОНАЛІЇ
MEETINGS, BIBLIOGRAPHY, PERSONALIA

THE 32ND WINTER SCHOOL OF THEORETICAL PHYSICS. SOLID STATE PHYSICS: FROM QUANTUM MECHANICS TO TECHNOLOGY
(Karpacz, Poland, 18–29 February 1996)

The School was organized by the Institute of Theoretical Physics of the University of Wrocław, the Institute of Physics of the Technical University of Wrocław and the Institute for Low Temperature and Structural Research of the Polish Academy of Sciences.

Winter Schools of Theoretical Physics traditionally organized by Wrocław physicists in Karpacz — a small town some 130 km from Wrocław — have a longstanding tradition and became an important ingredient of contemporary physical culture. Since they were organized for the first time in 1964 Karpacz schools have gradually developed into the meetings well known all over the world. Each school was devoted to some selected topic of theoretical physics, among them: statistical physics and condensed matter, functional methods in quantum field theory and statistical mechanics, theory of metals and many body problem, magnetism in metals and metallic compounds, mathematical aspects of quantum field theory, physics of phonons, ordering phenomena in condensed matter physics, etc. This year the School was mainly devoted to reviewing recent developments in quantum solid state physics with particular emphasis on actual or potential technological applications.

About 30 specialists from different countries presented lectures on subjects of their choise. The participants had an opportunity for posters and seminar contributions. A brilliant series of lectures delivered by Masuo Suzuki (Univ. of Tokyo) was devoted to the subjects tightly connected with his name in theoretical physics: exponential product formulas and quantum analysis, coherent anomaly method and quantum Monte Carlo method. The structure, properties and application of high-temperature superconductors were discussed in the lectures delivered by Bogdan Dąbrowski (Nothern Illinois Univ.), Charles Enz (Univ. of Geneva), Eduard Tutiś (Univ. of Zagreb). Recent advances in the study of quantum phenomena, including physics of quantum dots were tackled in lectures by Peter Maksym (Univ. of Leicester), Pawel Hawrylak (Inst. for Microstructural Sciences, Ottawa), Tapash Chakraborty (Inst. of Mathematical Sciences, Madras), Łukasz Turski (Center for Theoretical Physics, Warsaw). The study of phase transitions in anisotropic and diluted models was discussed in the lectures given by Boris Shalaev (A.F. Ioffe Physical and Technical Institute, St. Petersburg) and Yurij Holovatch (Inst. for Condensed Matter Physics, Ukr. Acad. Sci., Lviv). Neil Ashcroft (Cornell Univ., Ithaca) presented a lecture on dense phase of hydrogen and Philip Allen (State Univ. of New York, Stony Brook) about electronic excitations in metals.

This list can be continued. It is worth mentioning that soon the lectures of the 32nd Winter School in Theoretical Physics will appear in the series "Lecture Notes in Physics" published by Springer-Verlag edited by Prof. Jerzy Przystawa who headed the Organizing Committee and really the School has benefited greatly from his enthusiasm and energy.

Ukrainian physicists were represented at the School by Drs. Volodymyr Andreev and Yurij Prilutskii (both from Kyiv State University), Dr. Boris Danilchenko (Inst. of Physics, Ukr. Acad. Sci., Kyiv), Mr. Yurij Zatovsky and Mr. Mykhailo Medvedev (both from Odesa State University) and the author of this note.

Yurij Holovatch

THE EUROPEAN CONFERENCE "PHYSICS OF MAGNETIZM 96"
(Poznan, Poland, 24–28 June 1996)

The Poznan conferences on magnetism have been attracting leading scholars in this important area of physics from all over Europe since 1993. Ukraine has always been an active participant and this time it was represented by the countributions from scientiets working in Donetsk, Kyiv, Kharkiv, Lviv and Makiivka. Two reporters were coming from Lviv — A. S. Bajtsar (Ivan Franko University) and S. I. Sorokov (Institute for Condensed Matter Physics).

The present Conference was organized by Institute of Molecular Physics (Polish Academy of Sciences) and Institute of Physics (Adam Mickiewicz University) with the assistance of numerous sponsors. There were among them,in particular, State Commitee for Scientific Research, Ministry of National Education, Stefan Batory Foundation, *Lech* Browary Wielkopolski S. A. By the way the *Lech* is the most popular beer in Poland which we could see by ourselves. From the conversations with Polish scholars we came to know that the Government had given considerable support to science.

The Conference was held at the Science Centre of the Polish Academy of Sciences and consisted of lectures and oral and poster reports. The social programme included the reception party and an excurtion to the Palace at Rogalin which is a historical, artistic and park museum in the vicinity of Poznan.

The lectures of the first day were devoted mostly to problems of multilayer systems in which two ferromagnetic films are separeted by a non–magnetic spacer. The spin–dependent confinement of conduction electrons in the spacer produces an interlayer exchange coupling between the two ferromagnets. The interaction in question oscillates periodically in sign and magnitude with the spacer thickness. These phenomena are observed by spin–polarized photoemission experiments and magneto–optical measurements (P. Bruno, France).

In the countribution by a group of authors (P. Grünberg, M. Schaefer, K. Takanashi, U. Rucker; Germany, Japan, France) the coupling across Cu_xAu_{1-x} alloys and across Eus (a rare–earth ferromagnet with $T_c = 16$ K) was discussed and a dependence of coupling strength on x and on interlayer thickness was shown.

In another report (J. Kudrovsky, V. Drchal, I. Turek, M. Sob and P. Weinberger; the Czech Republic and Austria) the results of calculations for random spacers Co $/Cu_{1-x}M_x/Cu(001)(M = Ni, Zn, Au)$ and for alloyed magnetic slabs $A_{1-x}B_x$ $/Cu/A_{1-x}B_x(001)(AB = CoNi, CoFe, FeNi)$ were presented.

In his lecture T. Shinjo (Japan) dealt with the investigation of the magnetic relaxation phenomena in multilayers NiFe(100Å)/Cu(100Å)/NiFe(20Å)/Cu(100Å)/NiFe(100Å).

A very interesring lecture by K. Röll (Germany) was devoted to the direct overwrite technique (without the erasing of entire sectors before writting new data) using exchange coupled layer systems, in particular such quadrillers, as storage media.

The results of millikelvin magnetoconductivity measurements carried out for microstructures of $Hg_{1-x-y}Cd_yMn_xTe$ bicrystals and submicron wires of $Cd_{1-x}Mn_xTe$ in epilayers were presented in the contribution by T. Dietl (Poland). In addition to weak localisation magnetoresistance, universal conductance fluctuations and strongly nonlinear current–voltage characteristics were detected below 1 K.

B. Barbara (France) presented most recent results concerning the dynamics of a single ferromagnetic particle measured by the technique of micro–SQUIDs as well as relaxation studies performed on arrays of magnetic clusters.

The posibility of application of single–domain ferromagnetic of nano–particles (with the diameter less than 1 micron) for increased storage density was substantiated by P. A. Lingard (Denmark). Here the relaxation of magnetization in small particles on the basic Monte–Carlo simulation and droplet theory has been studied.

The problems of the three–fold symmetric magnetic two–ion coupling in the HCP rare earth metals (Tb, Er, Ho) were discussed in the lecture by J. Jensen (Denmark).

The computation of spectral function of a strongly correlated electron system with Emery– or three–band Hubbard model for the Cu-O planes of Cu based perovskities by applying proection techniques was carried out in the work of P. Fulde (Germany).

W. Suski (Poland) presented some remarks concerning the uranium ternary or pseudoternary systems in which the uranium atom as well as the transition metal atom are supposed to contribute to magnetic ordering.

The electronic and magnetic properties of series of $(TM_{1-x}TN_x)_2TiX$ alloys (TM, TN = Co, Ni, Pd, Fe, Cu and X = Sn, Al) as well as the influence of local distribution of atoms in sublattice on the value of magnetic moment on Co were investigated by a group of authors from Poland (A. Jezierski, M. Pugacheva, J. A. Morkowski and A. Szajek).

T. Story (Poland) analized the role of the structure of the valence band in creating the threshold carrier concenration induced ferromagnetic and spin glass transitions in $Sn_{1-x}Mn_xTe$ and $Pb_{1-x-y}Sn_yMn_xTe$ and presented $3D$ $x - p - T$ magnetic phase diagram.

In the reports of T. Schneider (Switzerland) it was shown that at zero temperature, as the hole concentration increases from the underdoped to the overdoped limit, the suprate superconductors undergo a dimensional crossover from $2D - XY$ to anisotropic $3D - XY$ critical behavior.

B. L. Gyorffy (UK) reviewed recent observations of de Haas-van Alphen oscillations in the superconducting state and summarized theoretical efforts to undestand this surprising phenomenon on the basis of the solutions to the Bogoliubov — de Gennes equations for the Abrikosov Flux Lattice.

The great efforts of theorists are directed at the investigation of ordering in ground state on the basis of simulation. It this connection the works of a group from Magdeburg (Germany) headed by prof. J. Richter is worth mentioning. The presented posters concerning $1D$ and $2D$ two band Hubbard model with one electron per site, $2D$ $J_1 - J_2$ Heisenberg model with Dzyaloshinskii–Moriya interaction, $2D$ $J_1 - J_2 - J_3$ Heisenberg antiferromagnet with long–range Lieb–Mattis interaction and others.

In the work headed by prof. G. Kamieniarz (Institute of Physics) a new transfer matrix approach was worked out to test the predictions of the molecular-field renormalization group. The latter was generalized to calculate critical properties of an extended Ashkin-Teller model. The molecular-field type scheme with correlations was applied to $2d$ Ising model in the entire temperature region.

The report of G. Gehring (UK) concerning the development and the application of density matrix renormalisation group to the problems of magnetism evoked great interest among the participants of the Conference. The method takes into account the lowest state for separate clusters on the lattice and the interaction between them. It was applied to the spin one chain with biquadratic exchange, to the spin $\frac{1}{2}$ models with competing exchange, to the $2D$ Ising model and to Hubbard model.

In the last week of June Poland was visited by the Ukrainian President Leonid Kuchma. The time of the meeting coincided with the Congress of "Solidarity". A rally commemorating the anniversity of the 1956 Poznan uprising was held in the city too. At that time the Soviet tanks helped the regime to restore the previous state of things. And on our last day in Poznan we could watch the 6th International Theatre Festival "Malta′96".

Anna Bajtsar, Sergij Sorokov

3RD LIQUID CONFERENCE
(Norwich, Great Britain, 6–10 July 1996)

КОНФЕРЕНЦІЯ З РІДКОГО СТАНУ
(Норвіч, Великобританія, 6–10 липня 1996)

6–10 липня 1996 року в Університеті Східної Англії, що розташований у мальовничому містечку Норвіч, відбулася третя міжнародна конференція з рідин. Вона продовжила успішну серію конференцій, що розпочалися в Люсії в 1990 році, а пізніше тривала у Флоренції в 1993 році. Цю зустріч організувала секція рідин Європейського Фізичного товариства за сприяння Університету Східної Англії.

Метою конференції було зібрати разом фізиків та хіміків, щоб обговорити мікроскопічні, мезоскопічні та макроскопічні аспекти цієї важливої галузі науки. Інше завдання — об'єднати науковців, що працюють над фундаментальними проблемами з прикладними дослідниками з хімічної, фармацевтичної та нафтової галузей промисловості.

На конференції науковці брали участь у пленарних лекціях, секційних та стендових доповідях. Працювало 11 секцій, зокрема: прості рідини та розчини, йонні та провідні рідини, динаміка реакцій в рідинах, рідкі кристали, фазові переходи та ін. Відбулися також круглий стіл з проблем комп'ютерної симуляції рідин та виставка наукових приладів, комп'ютерів і програмного забезпечення до них, останніх наукових публікацій.

У роботі конференції взяли участь понад 400 науковців з багатьох країн Європи, а також США, Японії, Мексики. Серед них М. Фішер (M. Fisher, USA) «Природа критичних явищ в йонних рідинах», Ф. Бароччі (F. Barocchi, Italy) «Останні досягнення в нейтронному розсіянні в рідинах», Ж.–П. Хансен (J.–P. Hansen, France) «Електричні подвійні шари та поліелектроліти», С. Т. Лагервал (C. T. Lagerwall, Sweden) «Чи можуть рідини бути макроскопічно полярними?»

Приємно відзначити, що в роботі цієї конференції брали участь і українські науковці. Це проф. Е. Якуб з Одеського державного медичного університету, В. Дідух з Львівського державного університету, В. Сохань з Інституту теоретичної фізики НАН України (тепер працює в Imperial College, London) та Т. Брик і Я. Чушак з Інституту фізики конденсованих систем НАН України, м. Львів. Участь українських вчених у таких престижних наукових конференціях, без сумніву, сприяє розвиткові української науки, популяризації її досягнень та співпраці з науковцями інших країн.

Ярослав Чушак

СУПЕРСИМЕТРІЯ В КВАНТОВІЙ МЕХАНІЦІ
В. М. Ткачук, Львівський державний університет, Львів, 1994, 66 с.

SUPERSYMMETRY IN QUANTUM MECHANICS
V. M. Tkachuk, Lviv State University, Lviv, 1994, 66 p. (in Ukrainian)

Any field of growing interest requires a textbook that explains the fundamentals in a clear and accessible manner. With this nice book, the students of Lviv University will feel that the field of supersymmetric quantum mechanics has such a textbook.

A concept of supersymmetry appeared in relativistic quantum field theory and elementary particle physics more than twenty years ago. Although the issue whether the nature is really described by a supersymmetric theory remains open, the ideas of supersymmetry are widely used at the present time in non–relativistic quantum mechanics, statistical mechanics, theory of disordered systems, mathematical physics. Therefore, the acquaintance of senior students with supersymmetry seems desirable.

After short introductory remarks the first chapter explains the basic ingredients of supersymmetry i.e. the introduction of supersymmetry generators the algebra of which contains anticommutators as well as commutators, the construction of Hamiltonian, the energy degeneration as a corollary of supersymmetry, and the supergroups. Next comes the chapter on supersymmetric quantum mechanics beginning with the introduction of the interaction for supersymmetric harmonic oscillator and the analysis of the energy spectrum and wave functions and ending with the exploiting of supersymmetry for seeking solutions of Schrödinger equation for a particle in one dimension and considering supersymmetric quantum mechanics with two bosonic degrees of freedom. The last chapter discusses a few problems where supersymmetry is real physical symmetry. Namely, the widely known problem about the electron moving in the magnetic field in two and three dimensions within the frames of Pauli equation, three–dimensional Coulomb and oscillator problems.

The main aim of this textbook is to present an introduction to the marvelous mathematics of supersymmetry and its amusing realization in the physical world avoiding the complexities of derivations and discussions that necessarily come, however, later. And the author successfully achieved this aim: beginners in theoretical physics as well as researchers and those willing to catch up with the new activities are provided with a nice introductory course into supersymmetric quantum mechanics.

Oleh Derzhko