

*The Ninth International School on Theoretical Physics*

**Symmetry and Structural Properties  
of Condensed Matter  
(SSPCM 2007)**



**Program and Abstracts**

*5 September – 12 September 2007, Myczkowce, Poland*

The Ninth International School on Theoretical Physics “**SYMMETRY AND STRUCTURAL PROPERTIES OF CONDENSED MATTER**” - (SSPCM 2007) is organized by:

**Rzeszów University of Technology, Poland**  
**AGH University of Science and Technology, Cracow, Poland**

**Main Topics:**

- Quantum information and computing
- Finite-dimensional Hilbert spaces
- Generating functions and exactly soluble models

**International Advisory Committee:**

W.J. Caspers (Enschede), R. Dirl (Wien), G.H.E. Duchamp (Paris), J.P. Gazeau (Paris), J. Karwowski (Torun), A. Kerber (Bayreuth), R.C. King (Southampton), J.D. Louck (Los Alamos), J. Morkowski (Poznan), Y. Ohnuki (Nagoya), K. Penson (Paris), V.I. Yukalov (Dubna), A. Vourdas (Bradford)

**Local Organizing Committee:**

T. Lulek (chairman), D. Jakubczyk, B. Lulek, L. Pytlik, S. Wolski,  
A. Wal (secretary)

The School is sponsored by:

**Nicholas C. Metropolis Mathematics Foundation (USA)**  
**European Physical Society**

## THE SSPCM 2007 SCHEDULE

September 6 Thursday	September 7 Friday	September 8 Saturday	September 9 Sunday	September 10 Monday	September 11 Tuesday	September 12 Wednesday
Morning session: <i>Invitation</i>	Morning session:	Morning session:		Morning session:	Morning session:	7.30 – 10.00 <i>Breakfast</i>
R. C. King	J.D. Louck	A. Ceulemans	8.00 – 10.00 <i>Breakfast</i>	K. Audenaert	A. Theophilou	
A. Vourdas	J. Zak	T. Sudbary		V. Youkalov	K.I. Wysokiński	10:00 <i>Bus</i>
M. Kuś	G.H.E. Duchamp	M. Mendez		K. Penson	C. Muñoz	
<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>		<i>Coffee break</i>	<i>Coffee break</i>	
A. Wójs	W.J. Caspers	J. Karwowski		J. McCabe	W. Sikora	
E. Zipper	J. Barnaś	M. Szopa		D. Chruściński	J. Styszyński	
V. Dugaev	T. Wydro	M. Bylicki		Cz. Jasiukiewicz	A. Gózdź	
Evening session:	Evening session:	Evening session:	10:00 – 19:00 <i>Excursion</i>	Evening session:	Evening session:	
B. Fiedler	A. Lehmann-Szweykowska	A. Radosz		I. Tralle	T. Lulek	
J. Dajka	T. Paszkiewicz	E. Lijnen		M. Kuźma	J. Milewski	
<i>Coffee break</i>	<i>Coffee break</i>	<i>Coffee break</i>		<i>Coffee break</i>	<i>Coffee break</i>	
M. Sznajder	M. Barone	A. Wal		A. Chuchmała	J. Domin	
M. Łabuz	D. Jakubczyk	P. Jakubczyk		M. Tytus	S. Topolewicz	
R. Olchawa	G. Sarbicki	H. Cheballah			<i>Closing</i>	
	<i>Violin and Cello Evening</i>	<i>Banquet</i>	19.15 – <i>Supper</i>	<i>Supper &amp; bonfire</i>		

*Daily: 7:30 – 10:00 - Breakfast, 9:00 – 13:00 – Morning session, 11:00 – 11:30 Coffee break, 13:30 Diner, 16:00 – 18:30 Evening session, 17:00 – 17:30 Coffee break, 19:00 Supper*

## Thursday, September 6

**Chairman: W. J. Caspers**

8.50 – 9.00	Invitation	Prof. dr hab. A. Sobkowiak, Rector of the Rzeszów University of Technology
9.00 – 9.40	R. C. King	Hopf algebras and characters of classical groups
9.40 – 10.20	A. Vourdas	Galois quantum systems
10.20 – 11.00	M. Kuś	Quantifying and measuring quantum entanglement
11.00 – 11.30		<i>Coffee Break</i>
11.30 – 12.00	A. Wójs	Second generation of incompressible quantum liquids in the fractional quantum Hall effect
12.00 – 12.30	E. Zipper	Entanglement of distant flux qubits via swapping
12.30 – 13.00	V. Dugaev	Anomalous Hall effect and Berry phase in two-dimensional magnetic structures
13.30		<i>Dinner</i>

**Chairman: T. Wydro**

16.00 – 16.30	B. Fiedler	Symmetry classes connected with the magnetic Heisenberg ring
16.30 – 17.00	J. Dajka	Entanglement macrobiosis in non-Markovian systems
17.00 – 17.30		<i>Coffee Break</i>
17.30 – 18.00	M. Sznajder	Possibilities of the Elementary Energy Bands Concept to determine characteristics of crystals and ordered structures
18.00 – 18.15	M. Łabuz	Degeneracy of spectrum of XXX model in the three-magnon sector at the centre of the Brillouin zone
18.15 – 18.30	R. Olchawa	The band structure of two-magnon excitations for a finite 2D lattice
18.45		<i>Welcome drink</i>
19.00		<i>Supper</i>

## Friday, September 7

**Chairman: R. C. King**

9.00 – 9.40	J. D. Louck	Properties of Clebsch - Gordan Numbers
9.40 – 10.20	J. Zak	Designing Energy Spectra in Finite Phase Plane
10.20 – 11.00	G. H. E. Duchamp	Many Hopf algebras of combinatorial Physics are free : applications to explicit computations
11.00 – 11.30		<i>Coffee Break</i>
11.30 – 12.00	W. J. Caspers	Degeneracies of eigenvalues of hermitean matrices
12.00 – 12.30	J. Barnaś	Spin and charge transport through quantum dots and molecules
12.30 – 13.00	T. Wydro	Excitation Spectrum at the Yang-Lee Edge Singularity of the 2D Ising model with boundaries
13.30		<i>Dinner</i>

**Chairman: J. Karwowski**

16.00 – 16.30	A. Lehmann-Szweykowska	A Model of Spin-Polarised Charge Transport in Magnetic Oxides
16.30 – 17.00	T. Paszkiewicz	Elastic properties of cubic crystals: Every's versus Blackman's diagram
17.00 – 17.30		<i>Coffee Break</i>
17.30 – 18.00	M. Barone	Symmetry and Symmetry breaking in Modern Physics
18.00 – 18.15	D. Jakubczyk	The role of Robinson-Schensted and Kerov-Kirillov-Reshetikhin in Bethe Ansatz
18.15 – 18.30	G. Sarbicki	Spectral properties of entanglement witnesses
19.00		<i>Supper</i>
20.00		<i>Violin and Cello Evening</i>

## Saturday, September 8

**Chairman: J. D. Louck**

9.00 – 9.40	A. Ceulemans	The symmetries of a finite point-group degeneracy
9.40 – 10.20	T. Sudbery	The search for general Bell inequalities
10.20 – 11.00	M. Mendez	q and (p,q)-analogs of the generalized Stirling numbers
11.00 – 11.30		<i>Coffee Break</i>
11.30 – 12.00	J. Karwowski	Few-particle systems: Quasi-exactly solvable models
12.00 – 12.30	M. Szopa	Persistent currents in distorted mesoscopic rings
12.30 – 13.00	M. Bylicki	From bound to quasistationary states
13.30		<i>Dinner</i>

**Chairman: A. Vourdas**

16.00 – 16.30	A. Radosz	Schwarzschild geometry and Doppler effect
16.30 – 17.00	E. Lijnen	Solving the particle in a polygonal box
17.00 – 17.30		<i>Coffee Break</i>
17.30 – 18.00	A. Wal	The magnetic translation group for a finite system and the Born-Karman boundary conditions
18.00 – 18.15	P. Jakubczyk	Construction of Kostka matrix at the level of basis
18.15 – 18.30	H. Cheballah	Coefficients of the normal ordering, approximate substitutions and combinatorial vector fields
19.00		<i>Banquet</i>

## Monday, September 10

**Chairman: G. H. E. Duchamp**

9.00 – 9.40	K. Audenaert	On the maximal output purity of completely positive qubit maps
9.40 – 10.20	V. Youkalo	Entanglement production with Bose atoms in optical lattices
10.20 – 11.00	K. Penson	
11.00 – 11.30		<i>Coffee Break</i>
11.30 – 12.00	J. McCabe	Structure Constant of the Yang-Lee Edge Singularity
12.00 – 12.30	D. Chruściński	Quantum Entanglement and Symmetry
12.30 – 13.00	Cz. Jasiukiewicz	Phonon-Drag Images of GaAs and AlAs Quantum Wells
13.00		<i>Dinner</i>

**Chairman: A. Theophilou**

16.00 – 16.30	I. Tralle	Exact solution of some boundary value problems for the complexified nonlinear Poisson equation
16.30 – 17.00	M. Kuźma	Ferromagnetic resonance in CdCrTe diluted magnetic semiconductor
17.00 – 17.30		<i>Coffee Break</i>
17.30 – 18:00	A. Chuchmała	Far-infrared laser action from parabollic quantum dots matrix
18.00 – 18.30	M. Tytus	Differences between photoluminescence spectra of type-I and type-II quantum dots
19.00		<i>Supper &amp; Bonfire</i>

## Tuesday, September 11

**Chairman: K. Penson**

9.00 – 9.40	A. Theophilou	Approximate spin symmetries in single determinantal approximations of many electron systems
9.40 – 10.20	K. I. Wysokiński	Conductance and thermopower of the the quantum dot coupled to normal, ferromagnetic or superconducting leads
10.20 – 11.00	C. Muñoz	Spin-orbit effects in 2D-structures
11.00 – 11.30		<i>Coffee Break</i>
11.30 – 12.00	W. Sikora	Symmetry analysis in the investigations of complex metallic alloys
12.00 – 12.30	J. Styszyński	Atoms and molecules in relativistic quantum mechanics
12.30 – 13.00	A. Gózdź	Projection evolution and delayed choice experiments
13.00		<i>Dinner</i>

**Chairman: M. Szopa**

16.00 – 16.30	T. Lulek	Bethe Ansatz, quantum computers, and unitary geometry.
16.30 – 17.00	J. Milewski	A Fibration of the Hipercubic Lattice in Bethe - Ansatz
17.00 – 17.30		<i>Coffee Break</i>
17.30 – 17.45	J. Domin	Vibronic analysis of $D^1\Delta$ state in $^{13}\text{C}^{16}\text{O}$ molecule
17.45 – 18.00	S. Topolewicz	The algebra of constants of motion within Bethe Ansatz
18.00		<i>Closing</i>
19.00		<i>Supper</i>



## **Wednesday, September 12**

7.30 – 10.00 - Breakfast

10.00 – Bus to Cracow via Rzeszów