



5th Workshop on
“Advances in Foundations of Quantum Mechanics and
Quantum Information with atoms and photons”
ad memoriam of Carlo Novero

3^o IQIS, 2010

INRIM, Turin, Italy 23-29 May 2010

Organizers: M.Genovese, G.Brida, M.L.Rastello,
A.Garuccio

Quantum 2010:

V Workshop ad memoriam of *Carlo Novero*

***Advances in Foundations of Quantum
Mechanics and Quantum Information
with atoms and photons***

IQIS 2010

23-29 May 2010 - Turin, Italy.

**Organizers: M. Genovese, G. Brida,
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Sunday 23		
Venue		
Monday 24		
08:40-08:50	Opening: M. Genovese	
08:50-09:00	Welcome to the participants: Elio Bava, INRIM President	
Session I - Chairman:		
09:00-09:25	G. Agarwal	Detrimental effects of quantum noise on entanglement and how to save against it
09:25-09:50	S. Polyakov	
09:50-10:15	S. Kueck	Metrological characterization of single photon detector quantum efficiency
10:15-10:40	G. Kitaeva	Spontaneous parametric conversion down to the terahertz range
10:40-11:00	Coffee break	
Session II - Chairman:		
11:00-11:25	A. Kamli	Quantum informatics with plasmonic meta-materials
11:25-11:50	K. Yuasa	Interference of Bose gases and Bose-Einstein condensation
11:50-12:15	M. Ridza Wahiddin	Quantum properties of the three-mode squeezed operator: triply concurrent parametric amplifiers
12:15-12:40	S. Takeuchi	Photonic quantum circuits and its application
12:40-13:05	S. Pascazio	Interference: first or second order?
13:05-13:25	H. de Guise	Constructing $su(1,1)$ intelligent states
13:30-14:30	Lunch	
Session III – Chairman:		
14:30-14:55	A. Sergienko	“Ghost” imaging with aberration cancellation
14:55-15:20	Y. Shih	Physical reality and two-photon interference of thermal light
15:20-15:45	S. Kulik	Entanglement of quantum systems from correlated classical random fields
15:45-16:10	U. Andersen	Noiseless phase amplification using noise
16:10-16:30	Coffee break	
Session IV - Chairman:		
16:30-16:55	M. Bellini	Manipulating light states by single-photon addition and subtraction
16:55-17:20	D. Bruss	Experimental generation of pseudo bound entanglement
17:20-17:45	E. Giacobino	Microcavity polaritons: from quantum optics to quantum fluids
17:45-18:10	Y. Kim	Reversing the weak quantum measurement for a photonic qubit
18:10-18:35	R. Migliore	Entanglement dynamics of two interacting qubits in independent reservoirs
18:35-19:00	C. Bamber	Transverse wavefunction measurement of a single photon source
19:00-19:25	A. Pathak	

Tuesday 25**Session I - Chairman:**

09:00-09:25	A. Aiello	Continuous-variable hyperentanglement in azimuthally polarized doughnut modes
09:25-09:50	A. Lvovsky	Quantum technology of light at the two-photon level
09:50-10:15	L. Krivitsky	Optimized generation of broadband polarization entangled states via type II parametric down conversion
10:15-10:40	M. Fedorov	Symmetry and entanglement of qutrits and ququarts
10:40-11:00	Coffee break	

Session II- Chairman:

11:00-11:25	S. Haroche	
11:25-11:50	F. De Martini	Decoherence-free macroscopic quantum superpositions: up-link micro-macroscopic teleportation
11:50-12:15	J. O'Brien	Photonic quantum logic in waveguide circuits
12:15-12:40	M. Genovese	Experimental realisation of sub shot noise quantum imaging
12:40-13:05	N. Treps	Quantum limits to space time positioning with light
13:05-13:25	R. Filip	Universal quantum interface
13:30-14:30	Lunch	

Session III- Chairman:

14:30-14:55	F. Petruccione	Non-Markovian unravellings with coloured noise
14:55-15:20	R. Zambrini	Spatial entanglement in OPOs with photonic crystals
15:20-15:45	G. Björk	Feasibility analysis of a W state Bell test
15:45-16:10	F. Bovino	
16:10-16:30		

Session IV - Chairman:

16:30-16:55	B. Englert	Minimal tomography with efficient witnesses
16:55-17:20	Z. Hradil	Operational tomography: fitting of data patterns
17:20-17:45	G. Marmo	Separability and entanglement in the geometrical formulation of quantum mechanics
17:45-18:10	V. I. Manko	Probability representation and suggesting experiments to check state-dependent uncertainty relations
18:10-18:35	S. Olivares	Qubit phase estimation in the presence of noise: the Bayesian approach
18:35-19:00	C. Curceanu	Experimental tests of quantum mechanics

Wednesday 26**Session I - Chairman:**

09:00-09:25	D. Petrosyan	Towards quantum information processing with hybrid quantum devices
09:25-09:50	O. Pfister	Observation of nonclassical photon-number statistics in a continuous-wave OPO below threshold
09:50-10:15	M. Chekhova	Macroscopic squeezed vacuum and its direct detection
10:15-10:35	T. Amri	Characterizing quantum properties of a measurement apparatus: an experimental illustration
10:35-11:00	Coffee break	

Session II- Chairman:

11:00-11:25	D. Chruscinski	Local approach to the non-markovian evolution of quantum systems
11:25-11:50	V. Buzek	
11:50-12:15	A. Jamiolkowski	On entanglement witnesses in multipartite systems
12:15-12:40	I. Jex	Networks of interacting quantum systems
12:40-13:05	G. Brida	
13:05-13:25	G. Benenti	Quantum process tomography and distance between quantum channels: a Fano-representation approach
13:30-14:30	Lunch	

Session III - Chairman:

14:30-14:55	H. Moya-Cessa	Classical quantum analogies: beam splitters, invariants and nonlinear coherent states
14:55-15:20	G. Kurizki	Manipulating system-bath correlations by unitary and non-unitary operations
15:20-15:45	S. Mancini	The “transitional behaviour” of quantum Gaussian memory channels
15:45-16:10	K. Matsumoto	On monotone 'metrics' in the channel spaces
16:10-16:30	Coffee break	

Session IV - Chairman:

16:30-16:55	J. Perina	Photon-number statistics of twin beams and their spatial properties
16:55-17:20	S. Pádua	Minimal tomography in spatial variables
17:20-17:45	P. Mataloni	Quantum computation with multiqubit cluster states based on 2-photon hyperentanglement

17:45-19:30

Poster session**19:35****Bus to Workshop Dinner**

Thursday 27**Session I - Chairman:**

09:00-09:25	M. Bina	Entanglement transfer in a multipartite cavity QED open system
09:25-09:50	A. Porzio	
09:50-10:15	K. Semba	Manipulation of entanglement in the heterogeneous quantum system
10:15-10:40	M. Paris	Transgressing the boundaries: nonGaussian states, nonMarkovian maps and nonentangled correlations in continuous variable quantum information
10:40-11:00	Coffee break	

Session II- Chairman:

11:00-11:25	M. D'Ariano	A computational grand-unified theory
11:25-11:50	H. Nikolic	Making nonlocal reality compatible with relativity
11:50-12:15	V. Berardi	Entanglement of neutrinos
12:15-12:40	T. Elze	Aspects of quantum in classical physics
12:40-13:05	A. Khrennikov	Entanglement of quantum systems from correlated classical random fields
13:05-13:25	A. Allevi	Wigner function reconstruction of pulsed fields by direct detection
13:30-14:30	Lunch	

Session III - Chairman:

14:30-14:55	C. Macchiavello	Violation of the generalised quantum Hamming bound in quantum error correction with correlated noise
14:55-15:20	N. Datta	
15:20-15:45	C. Silberhorn	Quantum information processing using time-multiplexing and optical fiber networks
15:45-16:10	L. Wu	
16:10-16:40	Coffee break	

Parallel Session IVa - Chairman:

16:40-17:00	C. Garola	
17:00-17:15	W. Schempp	Synchronized connectivity assessment: diffusion tensor magnetic resonance tomography and cerebral white matter tractography
17:15-17:30	A. Akhmeteli	Is no drama quantum theory possible?
17:30-17:45	G. Garbarino	Minimum detection efficiencies for a loophole-free bell-type test
17:45-18:00	B. Sanctuary	Anomalies in coincidence probabilities in EPR data
18:00-18:20	V. Ignatovich	Contradictions of the quantum scattering theory
18:20-18:35	F. Caruso	Noise and entanglement: from quantum communication to artificial photosynthesis
18:35-18:50	F. Plastina	From Zeno to anti-Zeno effect on the entanglement, in cavity QED

Parallel Section IVb – Chairman:

16:40-17:00	I. Ruo Berchera	
17:00-17:15	I. de Vega	Effects of dissipation in a quantum search algorithm
17:15-17:30	M. Belogolovskii	Quantum engineering of superconducting Josephson devices with ferromagnetic interlayers
17:30-17:45	S. Montangero	Control of many body quantum systems
17:45-18:00	D. Ciampini	New tools for quantum control of ultracold atoms in optical lattices
18:00-18:15	M. Paternostro	Entanglement relaxation and preservation due to local spin environments
18:15-18:30	V. Perinova	Quantum quasi-one-dimensional propagation of light in a down-converting medium
18:30-18:50	A. Smerzi	Entanglement and distinguishability of quantum states

Parallel Section IVc – Chairman:

16:40-17:00	A. Meda	Biphoton compression in standard optical fiber
17:00-17:20	T. Ishkakov	Comparison of two absolute calibration methods for photon-counting detectors based on squeezed vacuum direct detection
17:20-17:35	M. Naseri	Probabilistic bidirectional quantum secure communication based on shared partially entangled states
17:35-17:50	J. Novotny	Asymptotic evolution of random unitary operations
17:50-18:05	A. Fedrizzi	Discrete-time quantum walks on a line with single photons and beam displacers
18:05-18:20	C. Di Franco	Hamiltonian tomography in an access-limited setting without state initialization
18:20-18:35	M. Genoni	Quantifying non-gaussianity for quantum information
18:35-18:50	F. Buscemi	Entanglement creation in semiconductor quantum dot charge qubit

Friday 28**Session I - Chairman:**

09:00-09:25	R. Fazio	Optimal control at the quantum speed limit
09:25-09:50	F. Raffa	
09:50-10:15	M. Rasetti	
10:15-10:35	P. Giorda	Momentum-space analysis of multipartite entanglement at quantum phase transitions
10:35-11:00	Coffee break	

Session II- Chairman:

11:00-11:25	A. Gatti	
11:25-11:50	M. Bondani	On the choice of photoemissive detectors suitable for photon-number statistics of pulsed fields
11:50-12:15	S. Bartlett	
12:15-12:40	F. Benatti	Identical particles and quantum metrology
12:40-13:05	J. R. Croca	
13:05-13:25	T. Durt	Proposal of crucial experiments aimed at testing the existence of a quantum time (super) operator and applications of decay processes in quantum information
13:30-14:30	Lunch	

Session III - Chairman:

14:30-14:55	S. Papp	
14:55-15:20	S. Tanzilli	
15:20-15:45	D. Vitali	Quantum mechanics of a macroscopic oscillator: a membrane in an optical cavity
15:45-16:10	M. Palma	Reducing quantum control for spin-spin entanglement distribution
16:10-16:30	Coffee break	

Parallel Section IVa – Chairman:

16:40-17:00	A. Chirkin	
17:00-17:15	A. Bayat	Entanglement in the kondo spin chain
17:15-17:30	N. Lo Gullo	Vortex entanglement in Bose-Einstein condensates coupled to Laguerre-Gauss beams
17:30-17:45	N. Harshman	Entanglement in the quantum two-body problem

Parallel Section IVb – Chairman:

16:40-17:00	A. Gelman	Laser control of optical properties of two-level atoms embedded in a photonic crystal
17:00-17:15	S. V. Prants	Matter-wave chaos with cold atoms
17:15-17:30	S. Khademi	Quantum entropies in phase space
17:30-17:45	P. Marek	Measurement induced amplification of coherent states

Parallel Section IVc – Chairman:

16:40-17:00	P. Traina	
17:00-17:15	B. Bellomo	Interplay of adiabatic and quantum noise in solid state entanglement degradation
17:15-17:30	G. Giorgi	Entanglement dynamics of dissipative harmonic oscillators in presence of diversity
17:30-17:45	R. López-Peña	Semiclassical description of the Tavis-Cummings ground-state

Section V – Chairman:

17:45-18:10	N. Imoto	
18:10-18:35	I. Degiovanni	
18:35-18:55	J. Bergou	
18:55-19:00	M. L. Rastello	Conclusive remarks

Saturday 29

Leaving