

Bollettino Settimanale

Lunedì 6 Febbraio 2012	Martedì 7 Febbraio 2012	Mercoledì 8 Febbraio 2012	Giovedì 9 Febbraio 2012	Venerdì 10 Febbraio 2012
<p>AULA CONVERSI ORE 16.00 SEMINARIO INFORMAZIONE QUANTISTICA</p> <p>Quantum discord: a new paradigm of quantumness, an application to optomechanics <i>Laura Mazzola (Queen's University)</i></p> <p>When considering correlations shared by quantum systems composed by many parties, entangled states and separable states are often used as synonymous of quantum and classical states, respectively. A new perspective challenges such a commonly accepted view and acknowledges the existence of more-general-than-entanglement quantum correlations, represented by the so-called quantum discord. We give here a general overview on the topic and focus on a specific protocol bridging quantum discord and entanglement in optomechanical setting.</p>	<p>AULA CONVERSI ORE 16.00 SEMINARIO GENERALE</p> <p>Controlling the spontaneous emission of artificial atoms in photonic crystal microcavities Massimo Gurioli <i>(LENS and Department of Physics, University of Florence)</i></p> <p>Photonic crystals are periodic dielectric structures in which light flow can be molded and eventually the propagation is forbidden at certain frequencies and along given directions. By tailoring the design of the periodic structure, one can control the light propagation and can engineer the local density of states of the electromagnetic field. Among the several fascinating applications of photonic crystals, the possibility to introduce localized dielectric defects leads to the formation of states into the forbidden energy gap corresponding to spatially localized optical modes. These structures are often denominated photonic crystal microcavities and with appropriate design allow to realize optical modes with large quality factor which have been already successfully exploited for the realization of low-threshold lasers, single photon sources, add-drop filters, and for the implementation of cavity quantum electrodynamics experiments.</p> <p>In this talk I will give an introduction to cavity quantum electrodynamics experiments, discussing the photonic eigenvalue problem, the band gap formation and the tailoring of dielectric defects for enhancing the electromagnetic local density of states. As a prototype of investigation in solid-state quantum electrodynamics, I will consider the coupling between the electromagnetic field in a photonic microcavity and a semiconductor artificial atom, or quantum dot. The different regimes of weak and strong coupling will be considered and the relevant phenomena will be presented.</p>	<p>AULA CONVERSI ORE 14.30 SEMINARIO TEORICO</p> <p>Spinning the Top <i>Adam Falkowski (Orsay, LPT)</i></p> <p>I will discuss a new observable that probes the couplings of the light and top quarks to new physics. The observable is the threshold lepton asymmetry, that is the forward-backward asymmetry of the charged lepton in $t\bar{t}$ events near the production threshold. At threshold, angular momentum conservation implies that the top spins are uniquely fixed by the chirality of the initial quarks. Thus, measuring the final state top spins determines the chirality of the quarks which produced them. Information about the top spins can be extracted by measuring the threshold lepton asymmetry. This observable vanishes in tree-level QCD but is non-zero if new physics modifies the relative contribution of right-handed and left-handed quarks to top pair production. Models addressing the anomalous $t\bar{t}$ forward-backward asymmetry at the Tevatron always involve chiral couplings to light quarks. Models predicting identical $t\bar{t}$ forward-backward asymmetries can be distinguished by their threshold lepton asymmetries which range between plus and minus 25% in realistic situations.</p>		