

RAPPORTI DI ATTIVITÀ / ACTIVITY REPORTS

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International Conference on Quantum Information Processing and Communication (QIPC) 2013

Florence, June 30 – July 5, 2013

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Abstract. The International Conference on Quantum Information Processing and Communication (QIPC) 2013 was organized within the QUIE2T Coordination Action (Quantum Information and Entanglement Enabled Technologies), an FP7 Coordination Action to support QIPC in Europe. It covered a broad range of topics on quantum information and quantum communication, physical realizations of quantum systems for information technologies and topical subjects such as quantum enhanced measurements, foundations of quantum information, quantum simulations and many-body systems.

Keywords. Quantum information, quantum communication and computing, entanglement, non-classical states, quantum enhanced measurements, quantum simulation.

The International Conference on Quantum Information Processing and Communication (QIPC) 2013 was held at the University of Florence from June 30 to July 5, 2013. It was supported by the EU Coordination Action QUIE2T (Quantum Information Entanglement-Enabled Technologies), the CNR-INO Institute of Florence, and the EU Projects Q-ESSENCE, SIQS and SOLID. QIPC 2013 covered: quantum information and quantum communication; physical realizations of quantum systems for information technology such as photons, single atoms, ions, molecules, nuclear and electron spins, superconducting circuits, micro- and nano-mechanics, hybrid quantum systems, degenerate quantum gases; topical subjects such as foundations of quantum information, quantum measurements, quantum interferometry, cavity QED, optical lattices, quantum memories, many-body systems.

In recent years many new and advanced techniques of investigation have been developed in different areas of physics which can now be combined to achieve new and as yet unexploited possibilities. Control of the Quantum State of the fundamental constituents of light and matter has become a reality; at the same time the ability to develop artificial materials with precisely-engineered properties is progressing towards the single atom level. The combination of all these new possibilities has sparked unprecedented directions of research for fundamental

and applied physics based on purely quantum phenomena. In this scenario, the main objective of QIPC 2013 was to promote multidisciplinary research and the integration of approaches, as well as expansion to new fields and applications.

The scientific program included 30 invited talks, 55 contributed talks and more than 90 poster presentations. The 30 invited talks held in plenary sessions covered a wide range of topics, from quantum coherent networks to solid-state quantum memories, from quantum teleportation to large-scale entanglement, from quantum many-body dynamics to quantum photonics, etc. The contributed talks were presented in parallel sessions and covered: quantum communication and computing; quantum theory foundations; quantum information; quantum simulation; entanglement and non-classical states. As for the poster contributions, all posters were displayed for the full duration of the Conference, and the extended lunch breaks offered ample time for all conference participants to view the posters, and for poster authors to get feedback on their work. Posters were grouped by the following subjects: foundations, quantum simulation, quantum interferometry and measurements, entanglement and non-classical states, quantum communication and computation.

QIPC 2013 also comprised a number of extra-scientific events that testify to the diversity and liveliness of the community. A special session dealt with the practical simulation of a quantum computer and with the potential and limitations of the D-Wave device, based on experiments carried out at ETH Zurich. In an industry session with three invited speakers, insights into the commercial developments of current and future quantum were offered. Funding opportunities and future strategies were presented in a funding session featuring national and EU funding experts. A special session open to the public provided insight on how to disseminate Quantum Information Science and Technology to a general audience. During the Conference, the QIPC Young Investigator Award was presented to two outstanding young researchers in the field of Quantum Information Processing and Communication.

The conference was held at the University Multifunctional Center in Viale Morgagni. Quite appropriately it was opened in the Garbasso building in Arcetri, in the symbolic setting of one of the places where the foundations of Quantum Mechanics were laid. The participants at QIPC 2013 numbered about 250. The Conference brought together scientists from 28 different countries. More than 120 different universities and institutes and funding agencies, including the European Commission, were represented. The QIPC 2013 conference in Florence continued the highly successful series of conferences initiated by the FP6 Coordination Action program QUROPE, thus ensuring a continuous coverage of major QIPC events in Europe every two years. With a tradition going back over ten years, it has become amply clear that the international QIPC conferences are essential for the future development of the field. This year has to be considered exceptional for the QIPC community, since two of the founding fathers in the field received the

Nobel prize in physics. The results presented at the Conference covered European as well as overseas developments. We were quick to react to the upsurge of interest sparked in the news by the appearance of commercial products such as the DWAVE Computer. The Special session staged on practical quantum computing was indeed one of the best attended. The Universal Quantum Computer is still a far-fetched goal, but many interesting byproducts are clearly appearing outside laboratories. One of the most striking aspects of the Conference was the fact that so many of the participating researchers were very young, which is evidence of the liveliness of the field and of its bright prospects for the future.

