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VENUE

Shanghai Institute for Advanced Studies
Chinese Academy of Sciences
Building 11, 319 Yue Yang Rd.Shanghai 200031, China

A detailed map and the address of the venue will be available by Ms Panglung (email see below).

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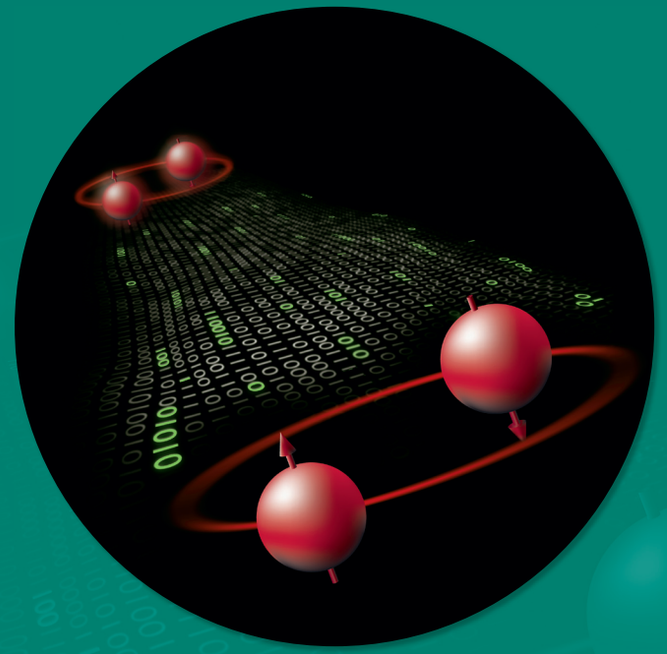
CHINESE ACADEMY OF SCIENCES MAX-PLANCK-GESELLSCHAFT
SHANGHAI INSTITUTE FOR ADVANCED STUDIES
EXPLORATORY ROUND TABLE CONFERENCES

2nd Exploratory Round Table Conference

QUANTUM INFORMATION SCIENCE

Shanghai, November 2nd to 4th, 2011



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SIAS House

Exploratory Round Table Conferences of the Chinese Academy of Sciences and the Max Planck Society

Exploratory Round Table Conferences or ERTC are a joint activity of the Chinese Academy of the Sciences (**CAS**) and the Max-Planck-Gesellschaft (**MPG**) under the auspices of the Shanghai Institute of Advanced Sciences (**SIAS**).

ERTC are intended to provide a platform for scientists of both **MPG** and **CAS** to exchange ideas and reflect on opportunities of newly emerging research areas together with the respective international key players at an early stage of these evolving fields. The main objective of the project is to act as a seed towards establishing new topical areas as part of a priority-setting process at the leading edge of science in the supporting organisations **CAS** and **MPG**. Moreover, the reports of the **ERTC** will be widely communicated to both science policy makers as well as to the general scientific community. **ERTC** are to be held at Shanghai in the premises of **SIAS** at least once a year.

MPG and CAS have maintained an exclusive partnership for over 30 years. The SIAS is an Institute of the CAS Shanghai Branch and was founded in 2001 with the support of the Max Planck Society as a hub for interdisciplinary and international dialogue.

Each ERTC has a total duration of 3-6 months for preparation and follow-up. The topic of the 2nd ERTC meeting will be Quantum Information Science, including the following subthemes:

- **Quantum systems for information processing**
- **Quantum communication and networking**
- **Quantum simulation**

ERTC on Quantum Information Science

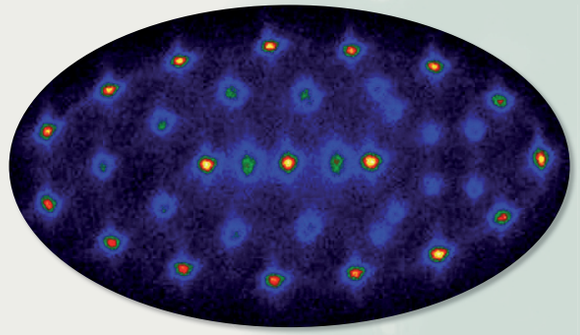
Over the past several decades the foundations of modern information technology have been changing rapidly. The strong influx of ideas from quantum physics has led to high performance quantum algorithms, emerging new capabilities for information transmission, and a nascent generation of quantum information processing devices. This way the science of quantum information has come to light.

The field of research addresses the question of whether we can gain new functionality and power by harnessing quantum mechanical effects through storing, processing and transmitting information that is encoded in inherently quantum mechanical systems.

Among the most spectacular discoveries and conjectures are quantum cryptography, which can allow the secure communication of information through public channels, and quantum computing, which may be able to efficiently solve certain computational problems believed to be intractable by classical computing. Quantum computers also allow the efficient simulation of complex quantum systems themselves, by overcoming computation time and memory issues that constrain classical computing.

Some of the fundamental challenges for the further development of quantum information science lie in assembling controllable and scalable quantum systems that realize not single but multiple quantum bits in quantum information processors (quantum computers, quantum simulators), and in interfacing such systems in quantum networks. The achievable degree of control relies on the ability to arbitrarily address, manipulate, and couple individual physical entities, like single atoms or single photons, which are used as information carriers. The interfacing of atoms and photons, the storage and retrieval of single photons, and the mapping of quantum states between distant entities, all constitute essential building blocks of future quantum communication networks and quantum information processors.

This **ERTC** aims for a critical review of the presently existing ideas, strategies and aspirations of quantum information science. The results of the **ERTC** will serve as background for further consideration of **CAS** and **MPG**.



Quantum simulations with ions
© T. Schätz, MPI of Quantum Optics

Invited Speakers

Shuai Chen (University of Science and Technology of China, Shanghai)

Jiang-Feng Du (University of Science and Technology of China, Hefei)

Guo-Ping Guo (University of Science and Technology of China, Shanghai)

Serge Haroche (École Normale Supérieure, Paris, FR)

Atac Imamoglu (ETH, Zurich, Switzerland)

Stefan Kuhr (University of Strathclyde, Glasgow, UK)

Wu-Ming Liu (Institute of Physics, CAS, Beijing, China)

Mikhail Lukin (Harvard University, Boston, USA)

John Martinis (UC Santa Barbara, USA)

Stephan Ritter (Max Planck Institute of Quantum Optics, Garching, Germany)

Oriol Romero-Isart (Max Planck Institute of Quantum Optics, Garching, Germany)

Ferdinand Schmidt-Kaler (University of Mainz, Germany)

Xiang-Bin Wang (Tsinghua University, Beijing, China)

Matthias Weidemüller (University of Heidelberg, Germany)

Harald Weinfurter (University of Munich, Germany)

Reinhard Werner (University of Hannover, Germany)

Tao Xiang (Institute of Physics, CAS, Beijing, China)

Andrew Chi-Chih Yao (Tsinghua University, Beijing, China)

Peter Zoller (University of Innsbruck, Austria)