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Call 2010 Draft Topics & Keywords

In the Call 2010, to be published in October, two hot topics are addressed, namely *Quantum Information Foundations & Technologies* and *Self-Awareness & Self-Consciousness* . The topics keywords and examples are given as illustration only. The *CHIST-ERA Conference 2010* in Italy, May 27-28, brings together scientists and CHIST-ERA's representatives in order to identify and formulate promising scientific and technological challenges at the frontier of research with a view to refine the scientific content of the call. The conference is based on a number of high-level keynote talks by invited internationally renowned specialists.

1. Quantum Information Foundations & Technologies (QIFT)

Interdisciplinary computational concepts, methodologies and tools for forming productively useful new knowledge from large masses of heterogeneous data.

Keywords:

- Quantum information theory, algorithms and paradigms: new quantum algorithms, computation paradigms and communication protocols. Quantum optimal control and quantum feedback methods
- Entanglement-enabled quantum technologies: improved atomic clocks. Entanglement enhanced metrology, sensors and imaging. Quantum simulators. Engineering of entangled systems
- Scalability of quantum processing systems: devices realizing quantum algorithms (up to ten qubits). Demonstration of fault tolerant computing and error correction on smalls scale systems. Demonstration of quantum simulation of systems that cannot be simulated classically
- Long distance quantum communication: development of effective schemes, devices and technologies able to overcome the current distance limitation of quantum communication. Quantum repeaters realizing reversible interconversion of different types of qubits

2. Self-Awareness & Self-Consciousness (SASC)

This is a fuzzy topic which also sprouts into cognitive psychology, neuroscience and philosophy. For the purposes of CHISTERA focus is put on IT-related areas.

Keywords:

- In computer science: autonomic computing (self-tuning, self-configuring, self-healing?). Self-x (or Self-* or Self-star) systems. Self-managing systems. Consciousness-inspired artificial intelligence. Global awareness (in complex and fast changing real and virtual computing environments). Machine learning. Context awareness, context collection, context representation, context architectures, context aware services. Multimodal perception
- In Automatics: fault-tolerant systems. Adaptive systems. Self-organizing control. Consciousness-inspired control theory. Situation estimation / interpretation
- In networks: self-aware networks. Autonomous networks. Smart packets. Dynamic routing

Examples:

- Self-tuning and self-healing systems in automatic systems (e.g., controllers, spatial probes, microprocessors?)
- Autonomic computing in networks and infrastructures
- Appropriate continuous interaction with people, devices, robots, virtual agents?

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