

Key-words

Within the ERA-Net CHISTERA, the two topics selected for the first joint transnational call (to be launched in 2010) are Quantum Information Foundations and Technologies (QIFT) & Self-awareness and self-consciousness (SASC).

The objective of the conference is to pin down the topic scope within the CHIST-ERA call; however and as a term of reference, a preliminary scope is given below.

1. Quantum Information Foundations and Technologies

CHIST-ERA projects will focus on new perspectives in ICT that exploit the quantum nature of information, thus providing new routes to circumvent the bottlenecks associated with the extrapolation of present-day information processing and technologies. The research work carried out is expected to advance significantly the state of the art of QIFT e.g., through the increased reliability, scalability and interconnection of components and/or the development of new algorithms, paradigms and protocols. Strong interplay between theory and experiment should achieve complete and realistic schemes for coherent manipulation and high-precision performance.

Key-words

- **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 small 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

Projects can address any of the above topics (or a combination of them)

2. Self-awareness and self-consciousness

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.

Key-words

- **Q 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

Possible projects topics 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