KICK-OFF MEETING – Friday 20 October 2017

SIRTEQ

SCIENCE ET INGÉNIERIE EN RÉGION ÎLE-DE-FRANCE POUR LES TECHNOLOGIES QUANTIQUES

http://www.sirteq.org
Quantum revolutions

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2\textsuperscript{d} quantum revolution: when reaching the level of individual quantum objects, the most surprising and far-reaching quantum properties (such as superpositions, entanglement) become experimental evidences.

These quantum properties open the way to revolutionary methods to process and manipulate the information carried by such objects.

source of individual photons

Quantum bit (qubit) in superconductors
1. Quantum sensors and metrology: *the ultimate physical precision*

Gyrometer « on a chip »
SYRTE, Obs. Paris, Thales

Micro-magnetometer
LAC Orsay, Thales

2. Quantum simulations: *beyond the computable.*

Ultra cold atoms
LCF Palaiseau, ENS Paris

3. Quantum communications: *security of data transfer.*

Integrated quantum cryptography
LIP6 Paris, LCF Palaiseau

Artificial atoms and micro-cavities - C2N Palaiseau

4. Quantum computing: *an algorithmic revolution.*

Quantum circuits with 4 superconducting qubits
SPEC / CEA Saclay
Disruptive Technologies

Investments at the international level:

* Public: Canada, USA, Australia, UK, Germany, Netherlands...

* Private: IBM, Intel, Google, Microsoft, Toshiba, D-Wave...

  in Europe: Bosch, Siemens, IMEC, Nokia, Airbus...

  in France: Thales, ATOS, SODERN... + PME: µQuans...

In Europe: «Quantum Technologies Flagship»
In Ile-de-France (broad Paris area) selection of « Domaines d’Interêt Majeur » (DIM), 4 years duration

SIRTEQ
SCIENCE ET INGÉNIERIE EN
RÉGION ÎLE-DE-FRANCE POUR LES
TECHNOLOGIES QUANTIQUES
SIRTEQ : LABS AND TEAMS

Some numbers:
* 300 CNRS, CEA or Univ. staff,
* 250 doctoral students
* 100 post-doctoral students,
* 650 researchers total
* >100 teams, 30 laboratories

* 5 COMUE

* gathers computer scientists and physicists from condensed matter, cold atoms, quantum optics, metrology, material science...
SIRTEQ : ORGANIZATION

Four pillars already quoted : sensing, simulations, communications, computing and two transverse axis :

A – Scientific and technological ressources
- identify and control les relevant physical systems
- stimulate technological innovations
  required to exploit them.

B - Animation, training, valorisation.
- communication : web site, actions for visibility, dissemination
- training : basic and advanced science, entrepreneurship, international
- valorisation : intellectual property, startup incubation and creation

Hybrid quantum circuit diamond-superconductor.
Governance and coordination

Three levels:

- **Scientific Committee**: 10 personalities external to the DIM (6 acad. and 4 ind.)

- **Steering Committee (COPIL)**: initiates and validates all relevant actions for the DIM: internal call for proposals, events, funding management.

- **Six offices, one for each vertical or transverse axis**: animates the project’s life, helps to manage the calls: choice of experts, first ranking of projects.

The committees warrant a good representation from the scientific, institutional, socio-economical point of views, taking also into account gender, age and careers.

**Responsabilities**:

- COPIL: coordinator, project manager, thematic direction
- Finance and administration: CNRS (DR4), accord INP.
- Institutional agreement: Groupement d’Intérêt Scientifique (GIS).
# Members of the Scientific Committee

- Jean-Michel Gérard, CEA Grenoble, France
- Anna Minguzzi, CNRS Grenoble, France
- Hans Mooij, University of Delft, The Netherlands
- Silke Ospelkaus, University of Hannover, Germany (not here today)
- Sébastien Tanzilli, CNRS Nice, France (not here, but online!)
- Jörg Wrachtrup, University of Stuttgart, Germany
- Cyril Allouche, ATOS-Bull, Paris, France
- Thierry Debuisschert, Thales Research and Technology, Palaiseau, France
- Bruno Desruelle, Muquans, Bordeaux, France
- Khaled Karrai, attocube, Munich, Germany
Members of the Steering Committee (COPIL)

Coordination: Philippe Grangier (LCF, IOGS) & Yara Hodroj (LCF, IOGS)

Thematic axis (pillars):

1 - Quantum sensors and metrology:
   Franck Pereira (SYRTE, Obs. P.) & Ivan Favero (MPQ, P7)

2 - Quantum simulations:
   Hélène Perrin (LPL, P13) & Pascal Simon (LPS, P11)

3 - Quantum communications:
   Eleni Diamanti (LIP6, P6) & Anthony Leverrier (INRIA)

4 - Quantum computation and algorithms:
   Patrice Bertet (SPEC, CEA) & Iordanis Kerenidis (IRIF, P7)

Transverse axis (enabling):

A - Scientific and technological resources:
   Jean-François Roch (LAC, P11) & Takis Kontos (LPA, ENS)

B - Animation, training and valorization:
   Michèle Leduc (LKB, ENS) & Pascale Senellart (C2N, P11)

Balanced for science (atoms: 4, solids: 7, comp.: 1), localisation (4 COMUE), gender (5 women, 9 men)
Industrial involvement

1. Collaborations for research and development on a medium-long term.

*Implementation*: research projects / contracts from ANR or Europe, fellowships, chairs...

*Ex.*: Thales (sensors), ATOS (computing), SODERN (clocks, sensors), Plassys (sensors) iXSea (accelerometers), NOKIA (crypto)...

2. Scientific / industrial back-up: follow and help the development of future technologies.

*Implementation*: chairs, involvement in meetings or training, in dissemination actions, in experts discussion...

*Ex.*: SAFRAN, SYSTRAN...


*Implementation*: new dedicated products for vacuum, epitaxy, cryogenics, integration, optics, Ires, optoelectronics...

*Ex. (IdF)*: Astemec, Fichou, Quantel, MyCryoFirm, Plassys, Precisoud, Systrel...

4. Companies or start-ups directly exploiting quantum technologies.

*Implementation*: selling quantum sensors (gravimeters, magnetometers), quantum sources, detectors, cryptographic devices...

*Ex.*: Muquans, Quandela, IDQuantique...