FET Flagships in Horizon 2020: Graphene, Human Brain Project and Quantum

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Horizon 2020
[2014-2020]

- Excellent Science: 24B€
- Industrial Leadership: 17B€
- Societal Challenges: 30B€

European Research Council
Future and Emerging Technologies (2.7B€)
Marie S. Curie Actions
Research Infrastructures
"Future and emerging technologies shall support collaborative research in order to extend Europe’s capacity for advanced and paradigm-changing innovation. It shall foster scientific collaboration across disciplines on radically new, high-risk ideas and accelerate development of the most promising emerging areas of science and technology..."

**Early Ideas**

**FET Open**

FET Open call continues: ~ 650 M€ budget

**Deadlines:** 16 May '18 [123 M€], 24 Jan '19 [160 M€]

18 Sep '19 [160 M€], 13 May '20 [203 M€]

(1) FET Proactive: Calls in 2018 and in 2020

- 2018: 6 topical areas for 88 M€

(2) FET Proactive HPC: Calls in 2018, 2019 and 2020

- 2018: INCO (Mexico & Brazil) for 4 M€

- 2019: Extreme scale HPC technologies: 64 M€

- Graphene & the Human Brain Project [150 M€ / Flagship]

- NEW: Quantum Technologies [130 M€]

- NEW: preparatory actions for new Flagships [6 M€]

(1) **ICT and Connected Society**

(2) **Health and the Life Sciences**

(3) **Energy, Environment and Climate change**
FET Flagships

What are they?

- Science-driven, large-scale research initiatives built around an ambitious unifying vision
- grand S&T challenges requiring interdisciplinary cooperation and involving academia and industry
- convert scientific advances into technology developments: from lab to the market place

~ 1 Billion Euro

~ 10 year duration

Flagships are implemented in close cooperation between the European Commission and the Member States
Why FET Flagships?

- Unprecedented S&T Collaboration
- International Collaboration
- Openness - New Partnership
- Innovation
- Talents in Europe
**The Graphene FET Flagship:**
Large potential for many applications

**AIM:** Move graphene and related layered materials from the lab to the market

**Consortium:** 150+ partners from 23 countries, and almost 50 associated members

**Duration and budget:** October 2013 for 10 years – EU budget: ~380 M€ (FP7 + H2020)

Driven by a Science and Technology roadmap + Technology and Innovation roadmap
The Human Brain Project FET Flagship (HBP) for understanding the brain

The Human Brain at Multiple Levels

Research Infrastructure
Data Analytics & Simulation

Multi-scale in space and time, multimodal

- Neuroscience Theory & Experimentation
- Ethics & Society
NEW: FET Flagship on Quantum Technologies

April 2016: The European Commission announces a Flagship initiative on Quantum Technologies

Aims

■ unlock the full potential of quantum technologies
■ accelerate their development and bring commercial products to public and private users

130 M€

Closing Date: 20 FEB 2018

Final report of the High Level Steering Committee on the Quantum Technologies Flagship
https://tinyurl.com/qt-hlsc-report
Prepublication of (DRAFT) FET work programme 2018-2020:

ICT Proposers' Day
High Level Group ("Lamy Report")

A vision and strategic recommendations to maximise the impact of the future EU R&I programmes: 'LAB – FAB – APP: Investing in the European future we want'

11 recommendations
Budget; Innovation policy; Education and training; New FP design for impactful research; "Mission-oriented" challenges; Synergy with structural funds; Simplification; Involving the citizens; Aligning EU & national R&I actions; International Cooperation; Better communications

3 pillars:
- Science and Skills
- Innovation & Competitiveness
- Global Challenges

THANK YOU!
The Quantum Manifesto

- an initiative of the European Quantum Community
- published in May 2016 (NL Presidency event) supported by over 3500 scientists, research institutions and companies
- main goal: aid the selection of QT as the new European flagship project

http://qurope.eu/manifesto

1. Communication
   - 0 – 5 years
     - A Core technology of quantum repeaters
     - B Secure point-to-point quantum links
   - 5 – 10 years
     - C Quantum networks between distant cities
     - D Quantum credit cards
   - > 10 years
     - E Quantum repeaters with cryptography and eavesdropping detection
     - F Secure Europe-wide internet merging quantum and classical communication

2. Simulators
   - A Simulator of motion of electrons in materials
   - B New algorithms for quantum simulators and networks
   - C Development and design of new complex materials
   - D Versatile simulator of quantum magnetism and electricity

3. Sensors
   - A Quantum sensors for niche applications (incl. gravity and magnetic sensors for health care, geosurvey and security)
   - B More precise atomic clocks for synchronisation of future smart networks, incl. energy grids
   - C Quantum sensors for larger volume applications including automotive, construction
   - D Handheld quantum navigation devices
   - E Gravity imaging devices based on gravity sensors
   - F Integrate quantum sensors with consumer applications including mobile devices

4. Computers
   - A Operation of a logical qubit protected by error correction or topologically
   - B New algorithms for quantum computers
   - C Small quantum processor executing technologically relevant algorithms
   - D Solving chemistry and materials science problems with special purpose quantum computer > 100 physical qubit
   - E Integration of quantum circuit and cryogenic classical control hardware
   - F General purpose quantum computers exceed computational power of classical computers