



Inițiative europene relevante: QTedu

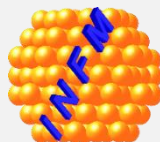
„QUANTUM TECHNOLOGY EDUCATION”

PROIECT: Elaborarea strategiei pentru dezvoltarea capacităților naționale în domeniul comunicațiilor cuantice (QTSTRAT)

Parteneri:



UNIVERSITATEA BABEȘ-BOLYAI
BABEȘ-BOLYAI TUDOMÁNYEGYETEM
BABEȘ-BOLYAI UNIVERSITÁT
BABEȘ-BOLYAI UNIVERSITY
TRADITIO ET EXCELLENTIA



Proiect finanțat de Ministerul
Cercetării, Inovării și Digitalizării
prin Planul sectorial



Contract: 2 PS / 11.11.2021

Conținut

- I. Ce e QTedu?
- II. Grupuri de lucru
- III. Comunitatea
- IV. Resurse
- V. Proiecte pilot



Quantum Technology Education

European Open Portal: community and resources

I. Ce e QTedu?

- Comunitate/Rețea + Bază de date/resurse/informații
- <https://qtedu.eu/>
- Scopul QTedu este de a sprijini EUROPEAN QUANTUM FLAGSHIP prin crearea ecosistemului de învățare necesar pentru a informa și educa societatea referitor la tehnologiile cuantice.
- „o societate pregătită cuantic, cu cunoștințe și atitudini pozitive față de tehnologiile cuantice, care să permită apariția unei forțe de muncă pregătite pentru acest domeniu”.

II. Grupuri de lucru

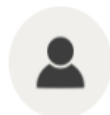
- WG1: Educație școlară (pre-universitară) și sensibilizarea/informarea publicului
- WG2: Inițiative educaționale în învățământul superior
- WG3: Învățare pe tot parcursul vieții și formarea forței de muncă
- WG4: Cercetare educațională în Tehnologii Cuantice (TC)
- WG5: Echitate și incluziune pentru inițiativele educaționale în TC



III. Comunitatea



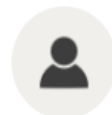
III. Comunitatea



Stefan Ataman

Extreme Light Infrastructure -
Nuclear Physics (ELI-NP)

ROMANIA



**Luiza Buimaga-
Iarina**

National Institute for Research
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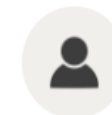


Nita Laurentiu

Quarks Interactive S.R.L.

Founder of Quantum Odyssey (
<https://www.quarksinteractive.com/>)

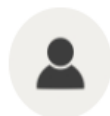
ROMANIA



Mona Mihailescu

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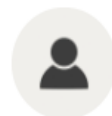
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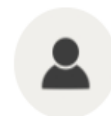
ROMANIA



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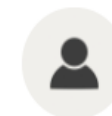
ROMANIA



Murariu Teodora

INCDTIM

ROMANIA



Liviu Zarbo

INCDTIM Cluj-Napoca

ROMANIA

IV. Resurse

- 1. Învățământ pre-universitar:
 - 2. Învățământ universitar
 - 3. Formare continuă și recalificare
 - 4. Implicare (mobilizare) comunitară
-
- Programe educaționale, cursuri și training-uri existente + internship-uri
 - Materiale/instrumente didactice
 - Metode/tehnici de evaluare

IV. Resurse



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Landscape of competences and skills

QTEdu CSA compiled a framework of competencies in Quantum Technologies in order to facilitate the planning and design of education and training projects. Discover it.

[European Competence Framework For Quantum Technologies](#)

[Qualification Profiles for Quantum Technologies](#)

Primary and Secondary School

[EU School Curricula](#)

[Programs, Courses and Trainings](#)

[Evaluation Tools](#)

[Material and Tools](#)

Higher Education

[Programs, Courses and Trainings](#)

[Internship Opportunities](#)

[Evaluation Tools](#)

[Material and Tools](#)

Lifelong learning and (re)training

[Programs, Courses and Trainings](#)

[Evaluation Tools](#)

[Material and Tools](#)

Outreach

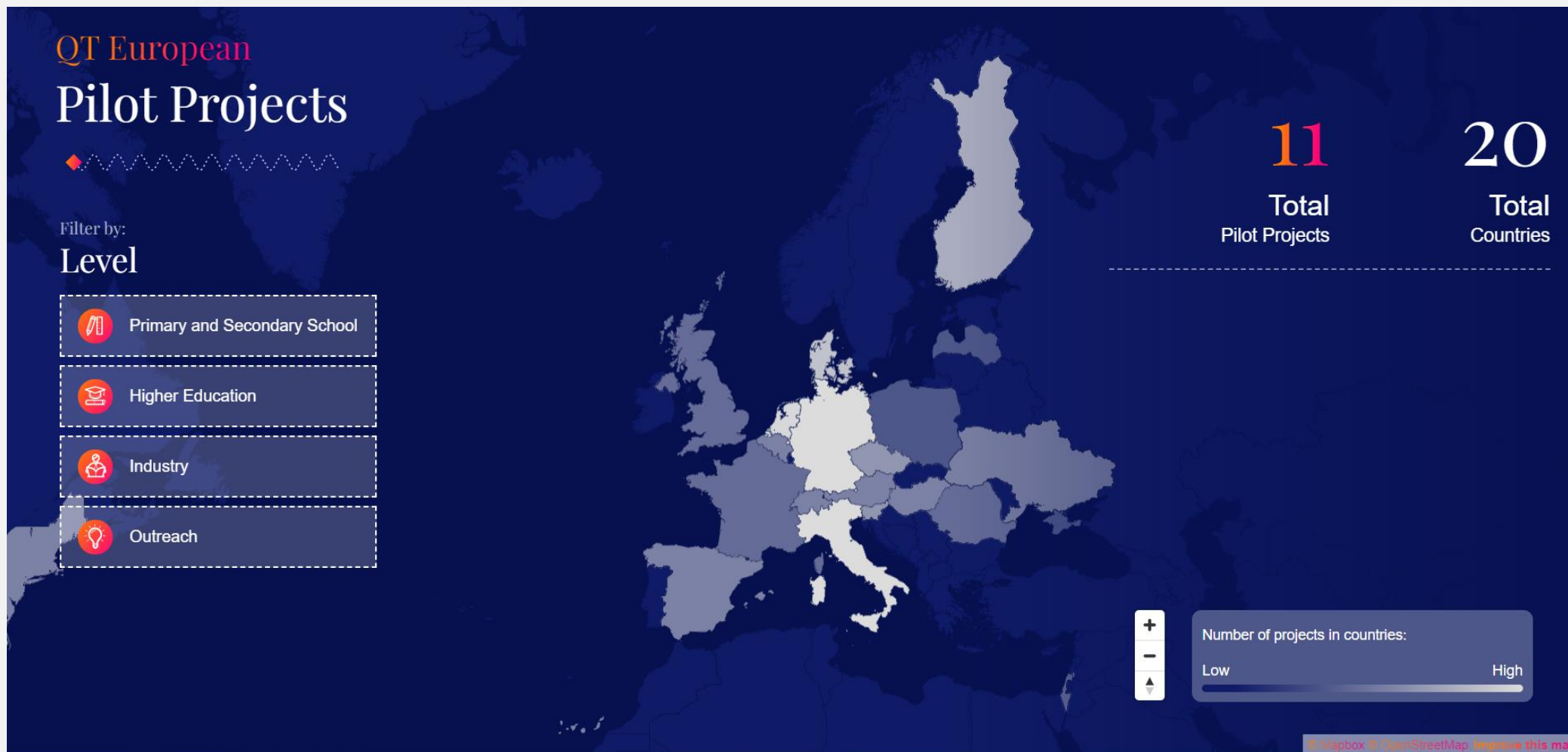
[Programs, Courses and Trainings](#)

[Material and Tools](#)

Quantum Technology Education

European Open Portal: community and resources

V. Proiecte pilot



V. Proiecte pilot

Domeniu	Proiecte
1. Învățământ pre-universitar	<ul style="list-style-type: none">• Community-based development of the Quantum Concept Inventory [QCI]• Quantum Teaching Materials for Schools [Q_TeMaS]• Development of quantum concepts via different two-state approaches [DQC-2step]• Playful Hands-on-Quantum Early Education [PHONQEE]• Quantum Technology Pedagogical Content Knowledge (PCK) for Teachers [PCK]
2. Învățământ universitar	<ul style="list-style-type: none">• <i>Quantum Technology in 5 Minutes [QT5M]</i>• Introducing Quantum Technologies: A Modular Set of Actions [IQTM]• Empowering the Future Experts in Quantum Science and Technology for Europe [EFEQT]• QTedu Open Master Pilot [QTOM]
3. Industrie	<ul style="list-style-type: none">• Quantum Retraining Network [QAREER]
4. Implicare (mobilizare) comunitară	<ul style="list-style-type: none">• Quantum Technologies Education for Everyone [QuTE4E]• <i>Quantum Technology in 5 Minutes [QT5M]</i>

V. Proiecte pilot

Pilot Projects in Romania

Active filters are hiding some of the Pilot Projects. To see all of them, please reset filters above to default.

Here below the list of pilot projects involved in the selected topic.

2 Pilot Project/s

 School education and Public outreach

Quantum Technologies Education for Everyone

Our key concept is that engagement is the first and foremost step for everyone's education, no matter the technical skills: general public, school and academic students and teachers, outreach experts, Q-tech companies, policy makers. In synergy, we will produce the essential syllabus of quantum physics concepts, conduct a Delphi study, realize joined live panels, hackathons, quantum game jams, showcasing, and the first European World Quantum Day, interconnect and thus enrich existing outreach platforms, and assess the coherence of the pilot deliverables with RRI dimensions.

QuTE4E



 Educational initiatives in higher education

Introducing Quantum Technologies: A Modular Set of Actions

The pilot is targeting BSc level augmentation as well as a small subset of MSc level education. It addresses parallel actions covering the four pillars of quantum technologies (QT): communication, sensors, simulation and computation. It is an ambitious, short-term, small-scale initiative combining education, science, engineering and education innovation. We treat the computer science, physics and pedagogical aspects. For the latter we use methods from the QTedu competence framework. Synergetic actions include guest lectures and joint projects.

IQTM



- 1 CONCEPTS OF QUANTUM PHYSICS**
- 1.1 Basic concepts
 - 1.2 Mathematical formalism
 - 1.3 Qubit dynamics

- 2 PHYSICAL FOUNDATIONS OF QUANTUM TECHNOLOGIES**
- 2.1 Atomic physics as a basis for quantum technologies
 - 2.2 Quantum optics as a basis for quantum technologies
 - 2.3 Solid-state physics as a basis for quantum technologies

- 3 ENABLING TECHNOLOGIES**
- 3.1 Optical technologies
 - 3.2 Solid state technologies
 - 3.3 Laboratory technologies
 - 3.4 Experimental control

- 5 QUANTUM COMPUTING AND SIMULATION**
- 5.1 Quantum gates
 - 5.2 Quantum programming languages and tools
 - 5.3 Quantum algorithms and computing techniques
 - 5.4 Quantum error correction
 - 5.5 Quantum simulation

- 7 QUANTUM COMMUNICATION**
- 7.1 Quantum cryptography
 - 7.2 Quantum networks
 - 7.3 Infrastructure for quantum communication
 - 7.4 Hardware for quantum communication

- 4 HARDWARE FOR QUANTUM COMPUTERS AND SENSORS**
- 4.1 Superconducting devices
 - 4.2 Spin-based devices
 - 4.3 Neutral atoms and ions
 - 4.4 Emerging qubit concepts
 - 4.5 Photonic systems
 - 4.6 Hardware for initialization, manipulation and readout of qubits
 - 4.7 Utilizing hardware platforms for quantum computing

- 6 QUANTUM SENSORS AND METROLOGY**
- 6.1 Electromagnetic field sensors
 - 6.2 Temperature, particle and pressure sensors
 - 6.3 Inertial and gravity sensing
 - 6.4 Quantum imaging
 - 6.5 Atomic clocks
 - 6.6 Application fields for quantum sensors
 - 6.7 Sensor integration and hybrid sensing

- 8 PRACTICAL AND SOFT SKILLS**
- 8.1 Practical/experimental skills
 - 8.2 Classical programming
 - 8.3 Management and leadership skills
 - 8.4 Knowledge of industrial processes
 - 8.5 Connecting QT with applications and use cases
 - 8.6 Teaching and outreach skills
 - 8.7 Networking and communication skills
 - 8.8 Research ethics, responsible research and innovation
 - 8.9 Intellectual property knowledge, standardization, certification

European Competence Framework for Quantum Technologies



VĂ MULȚUMIM PENTRU ATENȚIE!

<https://qtstrat.granturi.ubbcluj.ro/>
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