Innovate UK

Results of Competition: Commercialising Quantum Devices: Innovation R&D

Competition Code: 1804_CRD_CO_ISCF_QUANTUM

Total available funding is £20 million

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
RSK ENVIRONMENT LIMITED	Pioneer Gravity: Gravity sensors for infrastructure productivity, situational awareness and seeing the invisible	£342,612	£171,306
ALTRAN UK LIMITED		£11,801	£0
COVESION LIMITED		£286,829	£200,780
FRAUNHOFER UK RESEARCH LIMITED		£832,706	£832,706
GEOMATRIX EARTH SCIENCE LIMITED		£27,882	£19,517

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

MAGNETIC SHIELDS LIMITED		£265,553	£159,332
OPTOCAP LIMITED		£1,068,716	£524,358
QINETIQ LIMITED		£3,928	£0
SILICON MICROGRAVITY LIMITED		£499,214	£349,450
TELEDYNE E2V (UK) LIMITED		£3,093,836	£1,546,918
UNIKLASERS LTD.		£669,778	£468,845
University of Birmingham		£1,502,609	£1,502,609
University of Southampton		£229,529	£229,529

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Despite our increasing ability to detect and monitor objects that exist on land, sea, around buildings or in space, our ability to detect objects beneath the ground has not improved significantly. When it comes to attempting to locate a buried and forgotten pipe, telling the extent of a sink hole or assessing the quality of infrastructure we still often resort to digging or drilling holes. This presents a huge economic and societal cost as road networks are dug up, oil wells are dry or brown-field land is left undeveloped. Existing techniques are all fundamentally limited in either their sensitivity (classical microgravity), their penetration (Ground Penetrating Radar) or their cost (seismic). For over 30 years, universities and academics have been exploiting the strange effects of quantum superposition to measure gravity with astonishing sensitivity. Using a process called cold-atom interferometry, the wave-partial duality of a rubidium atom is compared to the phase of a laser beam in a way which can detect very small changes in the way atoms fall freely in a vacuum. Changes in this free-fall can be used to determine the local strength of gravity and if this measurement is sensitive enough, the measurement can be used to tell whether there are voids, pipes, tunnels, oil and gas reserves in the ground beneath your feet. Although the potential is there, there are huge scientific and engineering challenges to delivering this performance. This project is proposed by the UK consortium of the best scientific and engineering companies the UK has to offer. Working with leading UK universities, these companies are looking to overcome these challenges, and develop a new industry of 'quantum' cold-atom sensors in the UK. If these advanced performances can be demonstrated, the economic and societal benefit of this new 'quantum' industry in the UK is expected to be significant and long-lasting.

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Innovate UK

Results of Competition: Commercialising Quantum Devices: Innovation R&D

Competition Code: 1804_CRD_CO_ISCF_QUANTUM

Total available funding is £20 million

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
TELEDYNE E2V (UK) LIMITED	KAIROS	£3,531,663	£1,765,832
ALTRAN UK LIMITED		£11,801	£0
Cardiff University		£256,167	£256,167
COMPOUND SEMICONDUCTOR CENTRE LIMITED		£432,324	£259,394
HCD RESEARCH LIMITED		£485,582	£339,907

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

INTEGRATED COMPOUND SEMICONDUCTORS LIMITED		£265,636	£185,945
LEONARDO MW LTD		£137,549	£68,774
NPL MANAGEMENT LIMITED		£1,291,652	£1,291,652
OPTOCAP LIMITED		£449,993	£224,996
University of York		£57,583	£57,583

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
This project will develop a pre-production prototype of a miniature atomic clock for providing precise timing to a variety of critical infrastructure services, such as reliable energy supply, safe transport links, mobile communications, data networks and electronic financial transactions. The precise measurement of time is fundamental to the effective functioning of these services, which currently rely on Global Navigation Satellite Systems (GNSS) for a timing signal. However, GNSS signals are easily disrupted either accidentally or maliciously, and in prolonged GNSS unavailability, these critical services stop functioning. The reliance on GNSS for precision timing, and the consequent vulnerability of our essential services prompted InnovateUK to commission a report published by London Economics in June 2017\. It estimated the impact on the UK economy of a five day GNSS outage at £5.2B. That message is becoming widely understood and is creating a demand for timing solutions that are not GNSS dependent. The next generation miniature atomic clock arising from this project fulfills this need and will find widespread application in precision timing for mobile base stations, network servers for financial services, data centres, national power distribution networks and air traffic control systems. Further applications arise in areas where an independent timing reference is needed on mobile platforms and especially in areas where no GNSS signal is available. A high performance compact clock would benefit a range of useful capabilities, addressing civil and military applications, bringing both technical and economic gains for the UK.

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Innovate UK

Results of Competition: Commercialising Quantum Devices: Innovation R&D

Competition Code: 1804_CRD_CO_ISCF_QUANTUM

Total available funding is £20 million

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
TOSHIBA RESEARCH EUROPE LIMITED	Agile Quantum Safe Communications (AQuaSec)	£3,531,245	£1,765,622
BAY PHOTONICS LTD		£480,421	£336,295
BP P.L.C.		£107,759	£0
BT LIMITED		£337,190	£168,595
DASHBOARD LIMITED		£278,246	£194,772
Heriot-Watt University		£199,004	£199,004

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

IQE PLC		£479,949	£239,974
KETS QUANTUM SECURITY LTD		£1,004,595	£703,216
NPL MANAGEMENT LIMITED		£384,132	£384,132
Queen's University of Belfast		£311,225	£311,225
RADIANZ LIMITED		£26,400	£0
Royal Holloway Univ of London		£326,733	£326,733
SENETAS EUROPE LIMITED		£302,355	£181,413
TETHERED DRONE SYSTEMS LTD		£37,753	£26,427
University of Cambridge		£442,997	£442,997
University of Glasgow		£262,033	£262,033
University of Sheffield		£260,397	£260,397

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Much of the cryptography we rely on everyday is based on the difficulty of certain mathematical operations, such as finding the prime factors of a very large integer. However, recent advances in quantum computing means that these difficult math problems might soon be solved efficiently, with a potentially serious impact upon our security and digital economy. This project will develop technologies for "quantum-safe" communications, which are not threatened by a quantum computer. It will combine efficient implementations of new quantum-resistant algorithms and techniques from quantum cryptography, which are immune to all advances in computing, including quantum computing. The project will build prototypes, test their security and demonstrate their benefits to end users.

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Innovate UK

Results of Competition: Commercialising Quantum Devices: Innovation R&D

Competition Code: 1804_CRD_CO_ISCF_QUANTUM

Total available funding is £20 million

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
ARQIT LIMITED	3QN: Towards A New UK Industry for Novel Quantum Receivers in Nascent Satellite QKD Global Markets	£1,535,304	£1,074,713
BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY		£80,153	£40,076
FRAUNHOFER UK RESEARCH LIMITED		£137,485	£137,485
Heriot-Watt University		£195,453	£195,453
NPL MANAGEMENT LIMITED		£150,015	£150,015

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

REDWAVE LABS LTD		£397,956	£278,569
TELEDYNE E2V (UK) LIMITED		£148,828	£74,414
University of Cambridge		£283,669	£283,669
University of York		£231,765	£231,765
WIDEBLUE LIMITED		£1,122,228	£785,560

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Quantum Key Distribution (QKD) is a well understood application of quantum technology and there are several metropolitan fibre networks already established for QKD services. However, key distribution is limited by absorption inside optical fibres which mean that transmissions over distances greater than about 150 km are impractical. Free space communications, though, does not suffer the same degree of attenuation and single photon communication with satellites orbiting the Earth at several hundred kilometres has been demonstrated. Satellites then, provide an ideal vehicle for distributing quantum key information across very large distances between end users spread across countries or continents. However, in order to benefit from the advances in satellite technology, a network of Optical Ground Receivers (OGRs) are required to receive and detect the photons carrying the key information. The UK, as a major player in the development of advanced optical & photonic technologies, is well positioned to address this future market for OGR. This project works with users to specify OGR requirements and prototypes and tests a QKD receiver, whilst designing and making plans for scaled manufacture in the UK.

Note: you can see all Innovate UK-funded projects here https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results