



EPIC Online Quantum Technology Meeting on Atomic Clocks and Network Synchronization

A users' perspective on atomic clocks

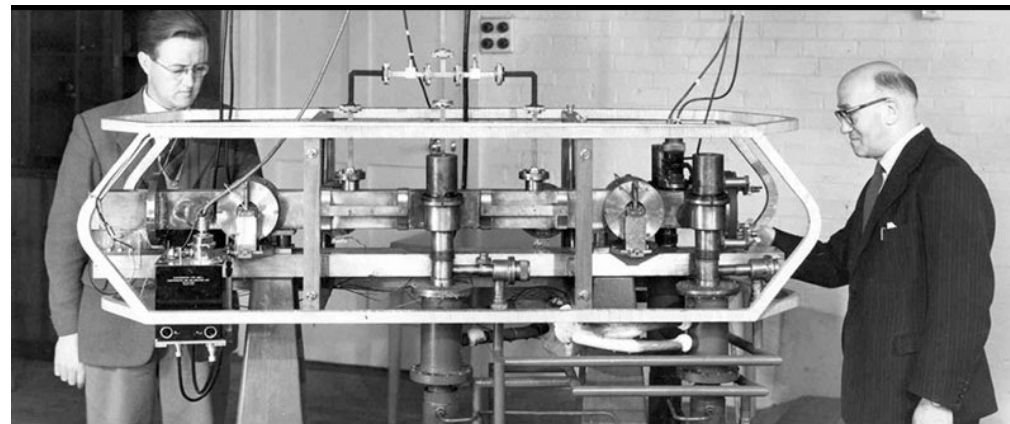
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NPL – the UK's National Metrology Institute

- Focused on overcoming technical barriers to innovation with activity across the UK and internationally
- ~1000 staff (650+ Measurement Science specialists)
- ~200 students and (400 labs)
- Advanced manufacturing, energy, visiting researchers/year
- 100+ research scientists and engineers in time, frequency, and quantum domain



1955: Louis Essen (right) and Jack Parry (left) standing next to the world's first caesium-133 atomic clock

NPL: What we do

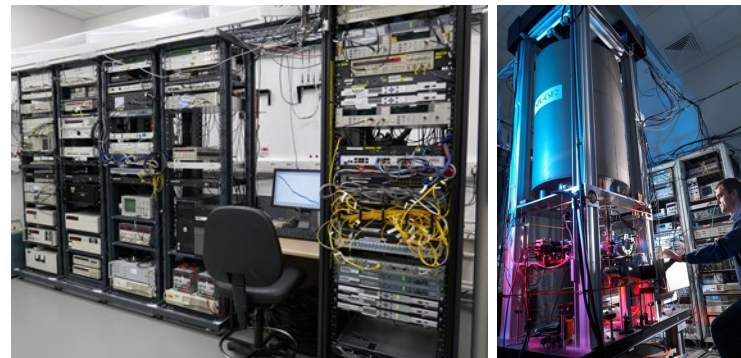
National Timing Centre programme

- £36m to build a resilient timescale for the UK
- Focus: Resilience, Innovation, Skills



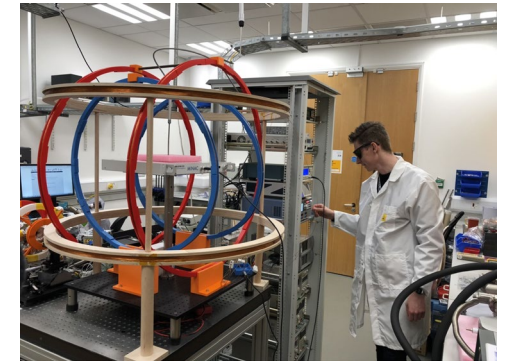
Realisation of the SI second and UTC(NPL)

- Cold Cs fountain microwave clocks
- UTC(NPL) timescale
- Highly collaborative international collaboration



Quantum

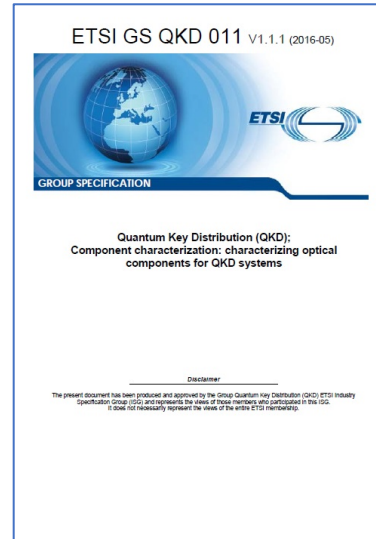
- Quantum Test and Evaluation programme
- Clock development
- Support all UK Quantum Hub consortiums



NPL: What we offer

Underpinning clock technologies

- Microcombs
- Vibration insensitive cubic cavities
- Intermediate optical frequency standards capabilities



International collaboration

- Square Kilometre array
- Standards
- International distributed atomic clock networks



Funding (mainly UK)

- Measurement for Quantum (M4Q)
- Innovation in time and frequency (National Timing Centre)

NPL: What we look for

Resilience

- Supply chain
- Innovative clock/distribution technologies
- Feed into “Resilient PNT”



User needs

- What does industry need to develop their products? Tell us!
 - Test and eval capability?
 - Standards?
 - Facilities?

Next generation

- Next gen optical atomic clocks for...
 - National standards and dissemination
 - Redefinition of the second



