I-HUB QUANTUM TECHNOLOGY FOUNDATION

IISER PUNE

Quantum Technologies Development

Quantum Information & Metrology
- Cold Atoms / Ions
- Superconducting circuits
- NMR / NV centers

→ Quantum Processor, Quantum Simulator, Quantum Clock, Quantum Sensor, Quantum Register, Quantum Algorithm

Quantum Communication
- Cold Atoms / Ions
- Photonic devices

→ Quantum Link, Quantum Clock

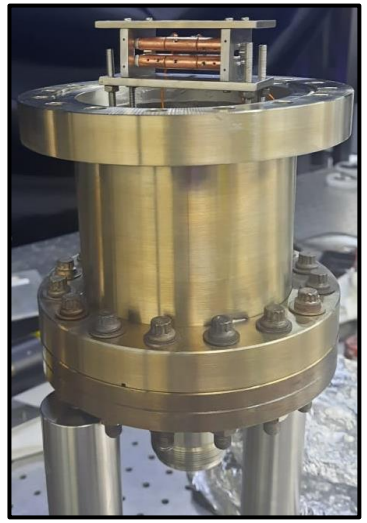
Quantum Materials and Devices
- Spintronic materials
- Optoelectronic materials
- Multifunctional materials

→ Sensor devices, Memory devices, Peripheral Hardware

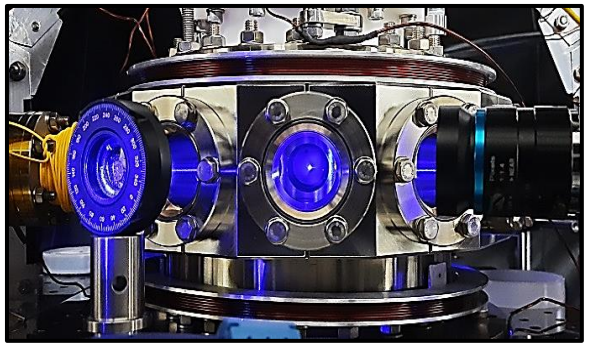
Theoretical / Computational investigations, Development of support technologies & instrumentation

Involving industry partners, commercialization, and import substitution

Quantum Computer
[Ca^+ Ion Trap]



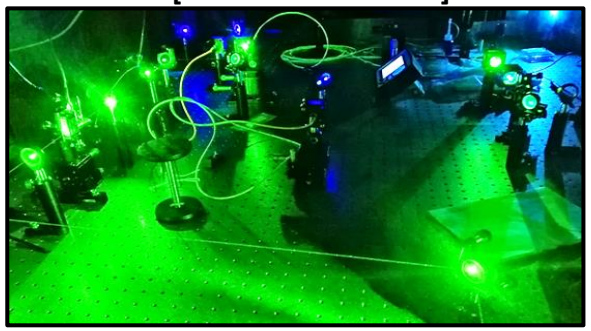
Quantum Clock
[Ultra Cold Sr atoms]



Gravimeter [Rb BEC]

Data Storage
[Spintronic Devices]

Quantum Sensors
[Diamond-based NV]



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Technology demonstration of Gravimeter at HI lab

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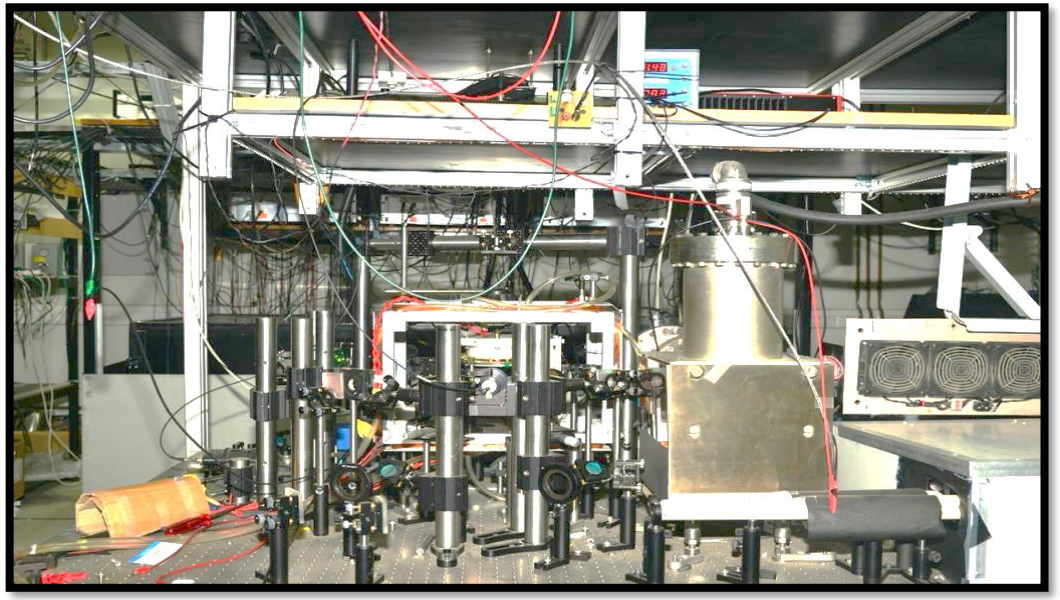
Success Story

High precision measurement of absolute local gravitational acceleration ‘g’

$$g = 9.7959938810(19)\ \mathrm{m/s^2}$$

Latitude, Density (Rocks), Moon, Hydrology, Altitude, People, Chairs



Work in Progress:

- ❑ Engineering prototype – Transportable Gravimeter
- ❑ Higher Precision, upto 8th decimal place

Successfully demonstrated 6th decimal place of ‘g’

Highlights of the Achievements

No. of Technologies Developed/Commercialized

Development of Gravimeter: TRL 7

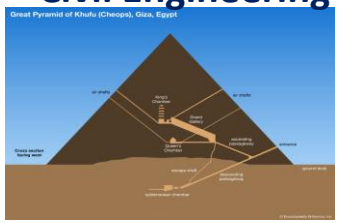
Applications: Hydrology & Underground Resource Mapping

High precision measurement of absolute local gravitational acceleration ‘g’

$$g = 9.7959938810(19)\ \mathrm{m/s^2}$$

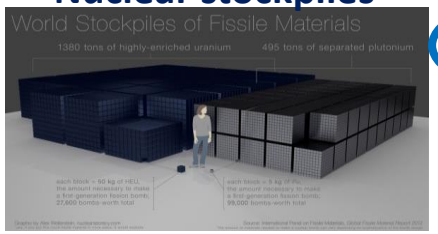
Latitude, Density (Rocks), Moon, Hydrology, Altitude, People, Chairs

Civil Engineering

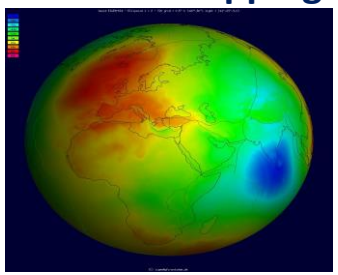


Tunnels

Nuclear stockpiles

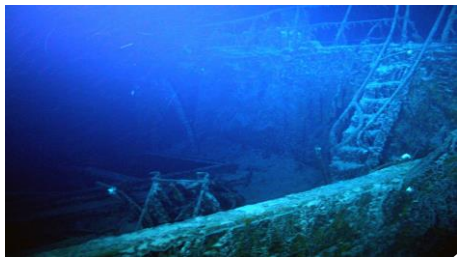


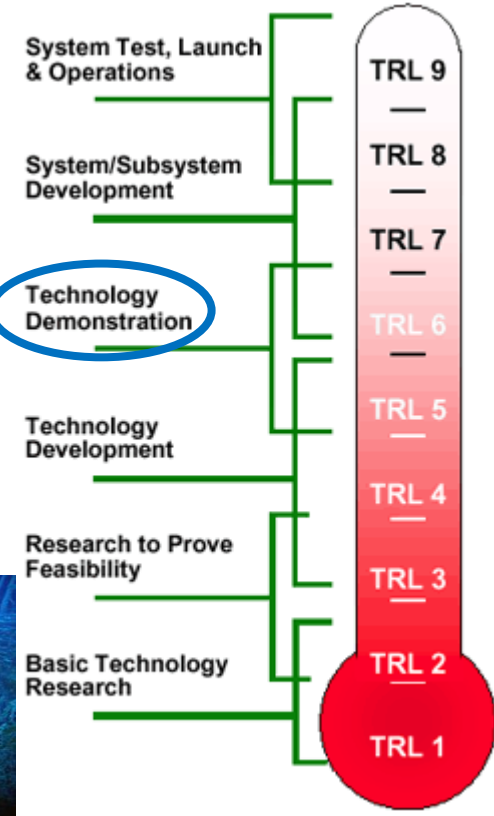
Geoid Mapping

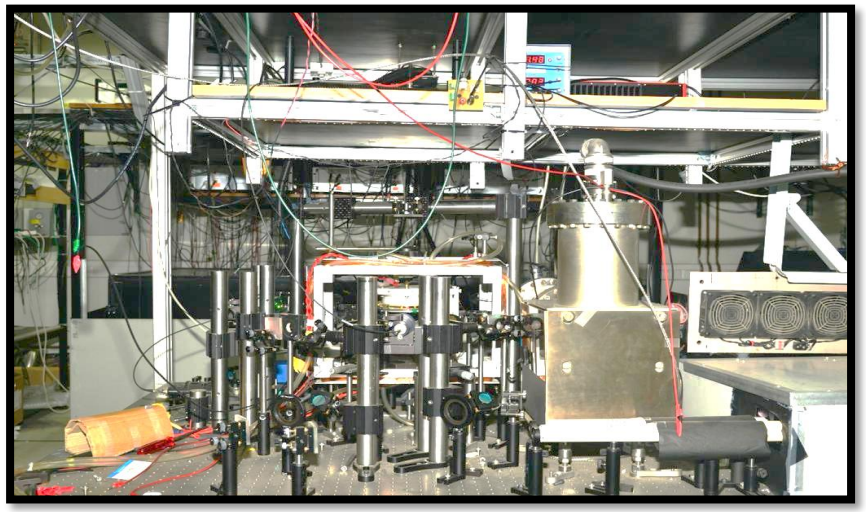


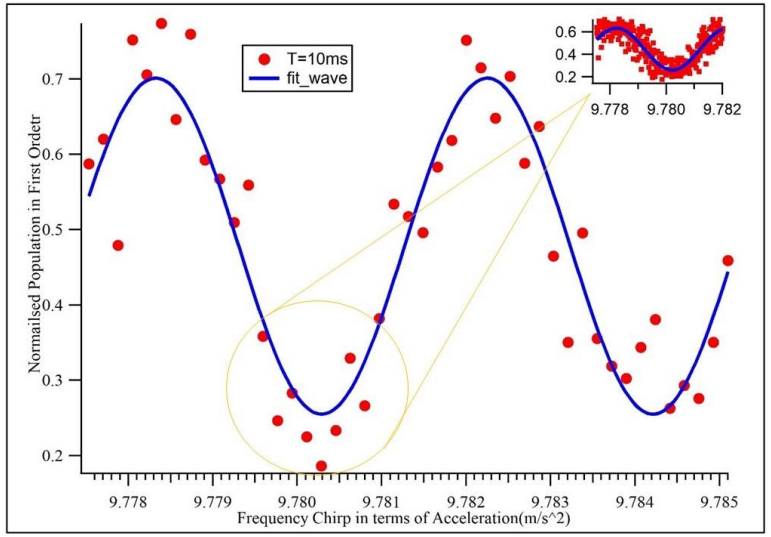
Hidden machinery

Marine wreck & mines









Interferogram time T = 10 ms

Current Sensitivity ~200 micro-gal

T(ms)	$\left(\frac{\Delta g}{g}\right)_{limit}$	$\frac{\Delta g}{g}$
10	$9.4 * 10^{-7}$	$2 * 10^{-6}$

I-HUB QUANTUM TECHNOLOGY FOUNDATION

I-HUB QTF@ Centre-State Conclave, Ahmedabad

10-11 September 2022

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Success Story

Successfully demonstrated India's first portable cold atoms GDQLabs Developing neutral atom Quantum Computer

QT Sensitization @ COEP | VIIT | IUCAA

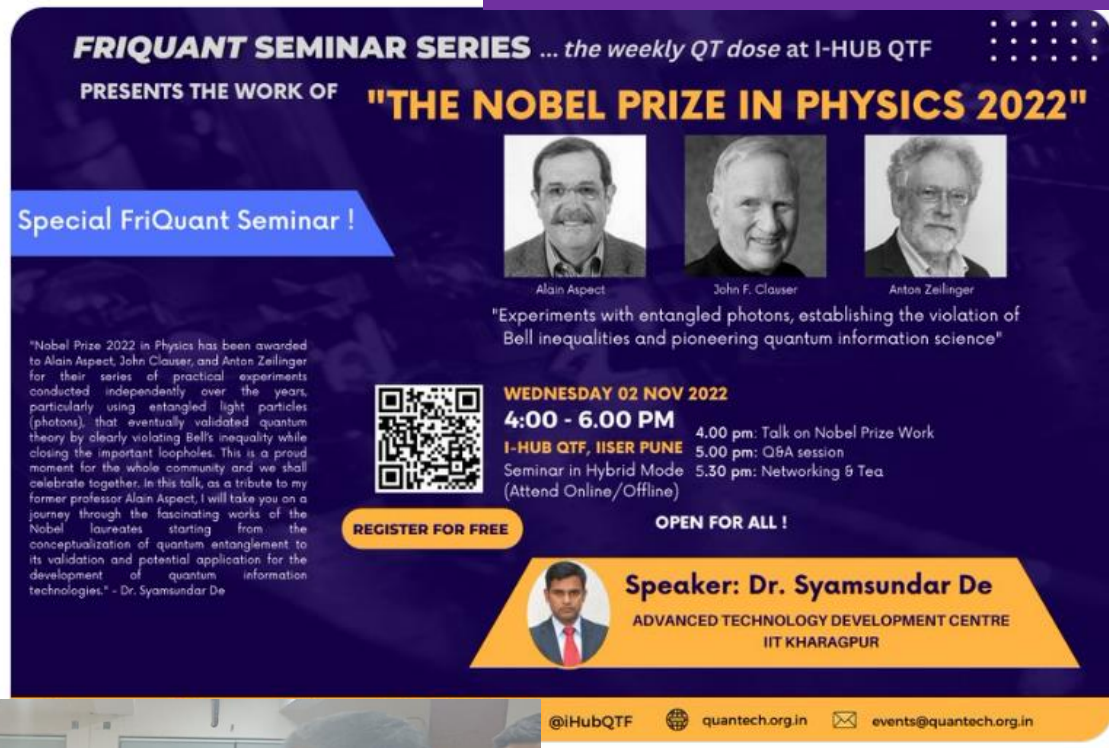
I-HUB QUANTUM TECHNOLOGY FOUNDATION

Nobel Prize Talk
2nd November 2022

COEP Tech

IUCAA

VISHWAKARMA INSTITUTE OF TECHNOLOGY, PUNE



I-HUB QTF@IBM THINK 2022