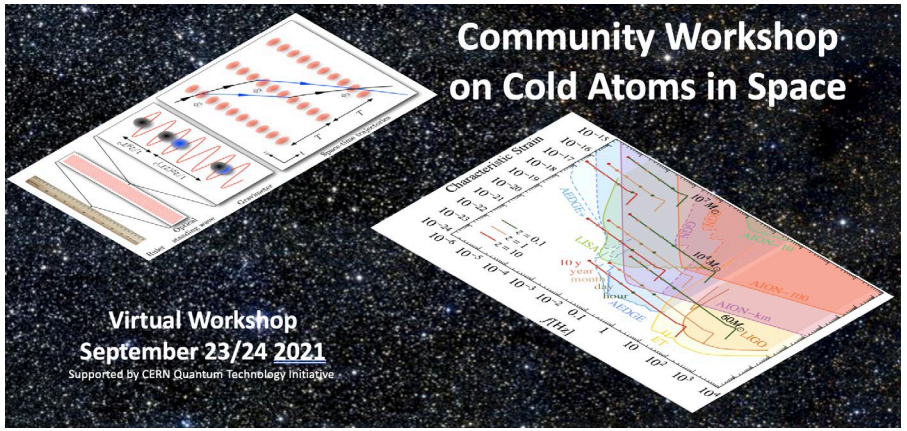
Session: Earth Observation Reviews **(Day 1)**



- **User requirements as a basis for a future quantum space gravimetry mission** (Federica Migliaccio)
  An introduction highlighting how Earth sciences need gravimetry to observe and monitor mass and mass transport in the Earth system and what are Earth science user requirements.

- **Methods for atom interferometry in space in the context of Earth observation** (Christian Schubert)
  Overview of satellite missions for the Earth gravity field and quantum sensors for atom interferometry. State-of-the-art of atomic interferometry based quantum sensors, further developments needed and the challenges for operating them in space. Potential gain of Earth observation by quantum sensors.

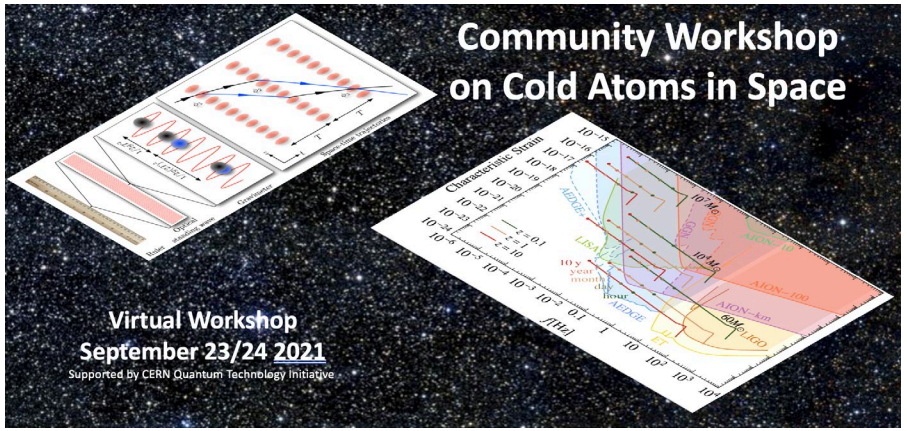
- **Earth Observation: ESA perspective** (Olivier Carraz)
  Perspective of ESA for going from classical to quantum space gravimetry. An outlook of concepts for future QSG missions, hardware development and results: (i) Cold Atom Interferometer (CAI) interleaved quantum gravity gradiometer (QGG), (ii) Hybridization classical accelerometers/CAI for SST.

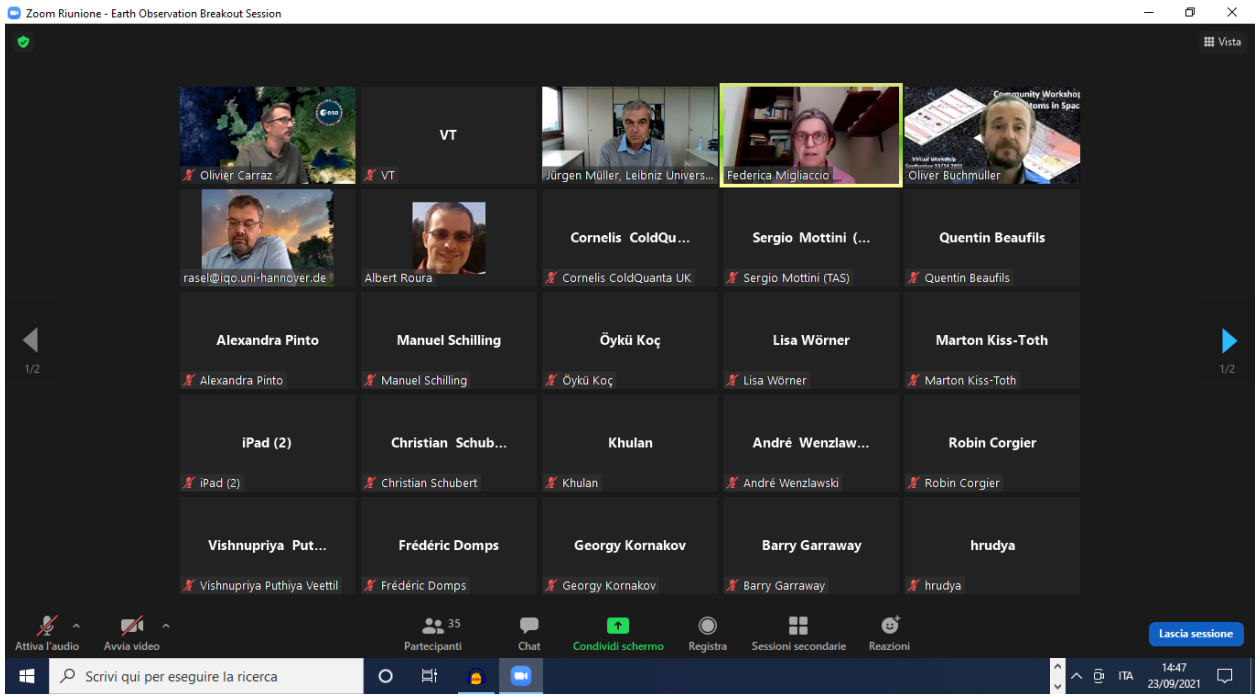
- **Quantum space gravimetry at European Commission** (Frederic Domps)
  Long-term objectives of DG DEFIS: deploy a EU QSG pathfinder mission within this decade to demonstrate the technology (BEC) in orbit, assess the feasibility of mission concept, ensure EU non-dependence and leadership in this domain and pave the way for a EU QSG mission within the next decade.

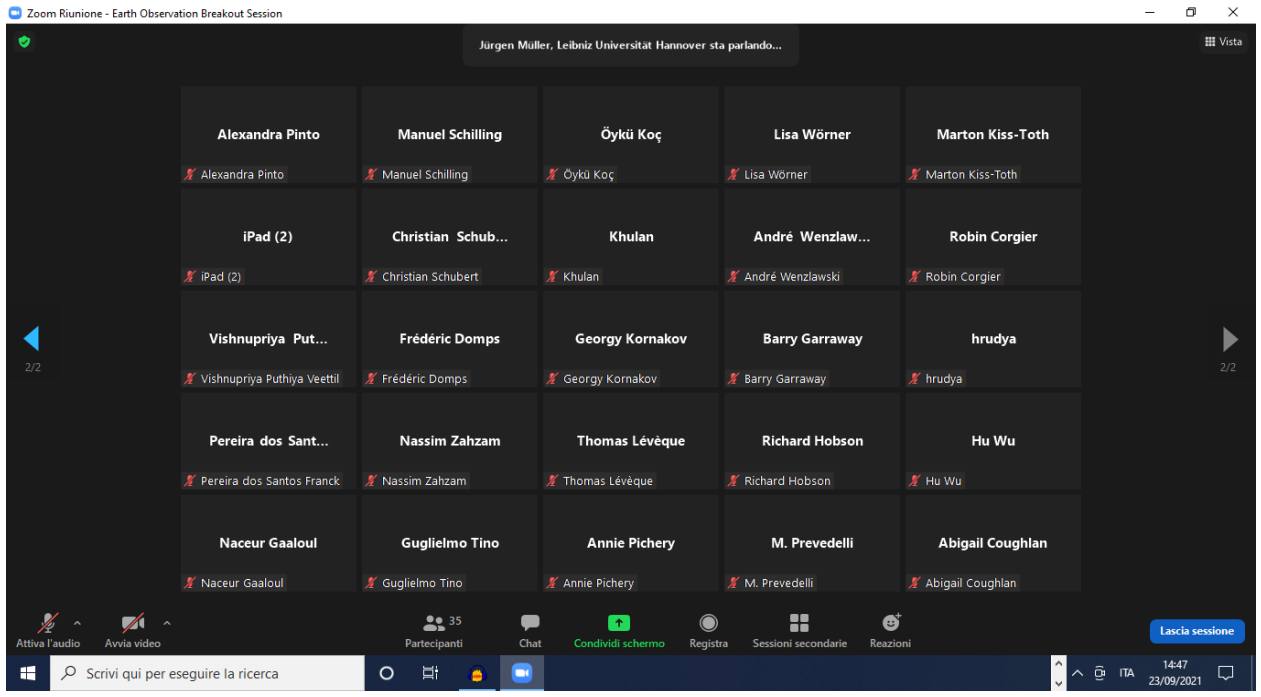
- **CAI and GRICE Studies** (Franck Pereira dos Santos)
  Comparison of electrostatic and atomic accelerometers. Outline of CAI gradiometer study and results. Outline of GRICE study and results (twin satellites with onboard quantum accelerometers and laser ranging). Conclusions: atomic sensor technology is under maturation, R&D and engineering developments still needed, more refined studies are required.

Virtual Breakout Room Earth Observation

- Day 1 (first breakout room) 40 participants
- Day 1 (second breakout room) 17 participants







Earth Observation - Breakout Room Discussion 23/09/2021

- ✓ The pathfinder mission
  - ESA perspective: ESA EOP needs to have added value from a pathfinder, i.e. science results showing that Quantum Technology can provide science return on the observation of gravity
    Two options being assessed: a Quantum Technology demonstrator on board a pair of NGGM/MAGIC satellites (no delay of the launch date); a dedicated mission

    ESA will have the Ministerial in 2022: priorities will be presented, among them QSG pathfinder and mission consolidated objectives >> priority define objectives of pathfinder
    A roadmap is being defined, for which is also asked from delegates of Member States

  - EC perspective: priority is the pathfinder must prove that a payload based on Quantum Technology for gravimetry can survive launch and work when in orbit
    - less stress on the technology requirements for the science return
    - less complex than accommodating another payload inside NGGM/MAGIC, which is already in Phase A

  - Regarding the call HORIZON-CL4-2021-SPACE-01-62: Quantum technologies for space gravimetry what is the role of UK?

- Concern: the requirements of other communities must be taken into account >> fundamental physics
- Concern: too much stress on the level of expectations? Failure of the pathfinder would kill Quantum Space Technology for a long time