

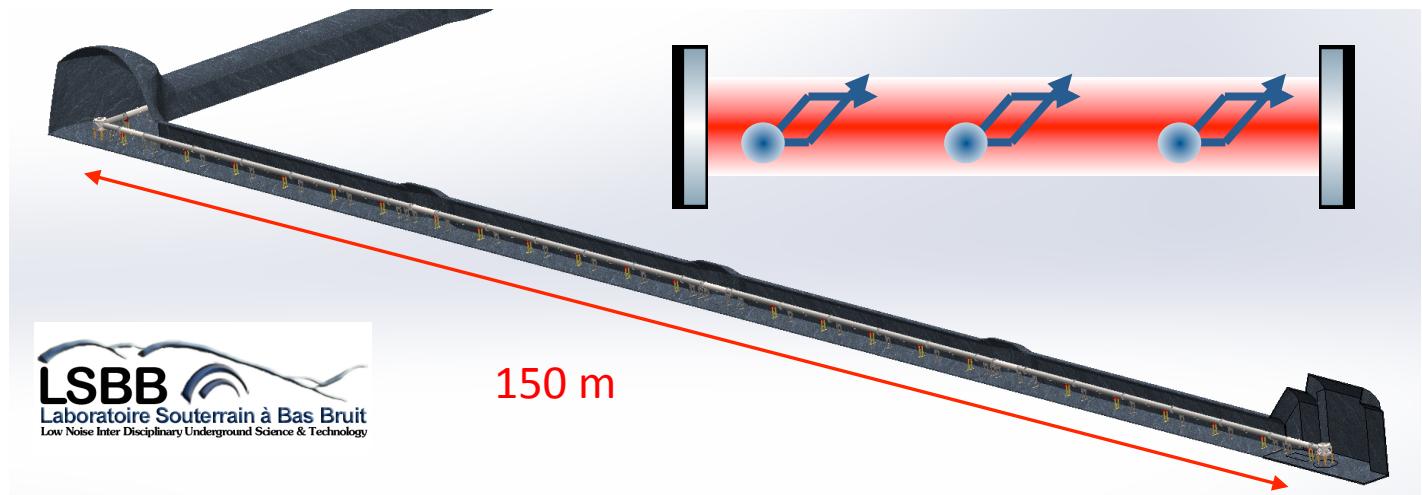
MIGA, A LARGE SCALE ATOM INTERFEROMETER

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for the MIGA consortium

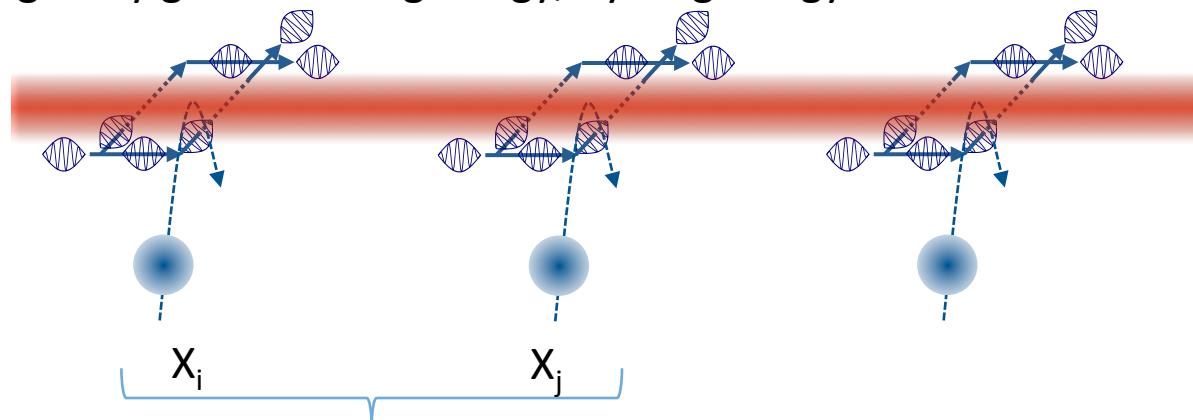


Principle

Build a new instrument combining matter-wave and laser interferometry



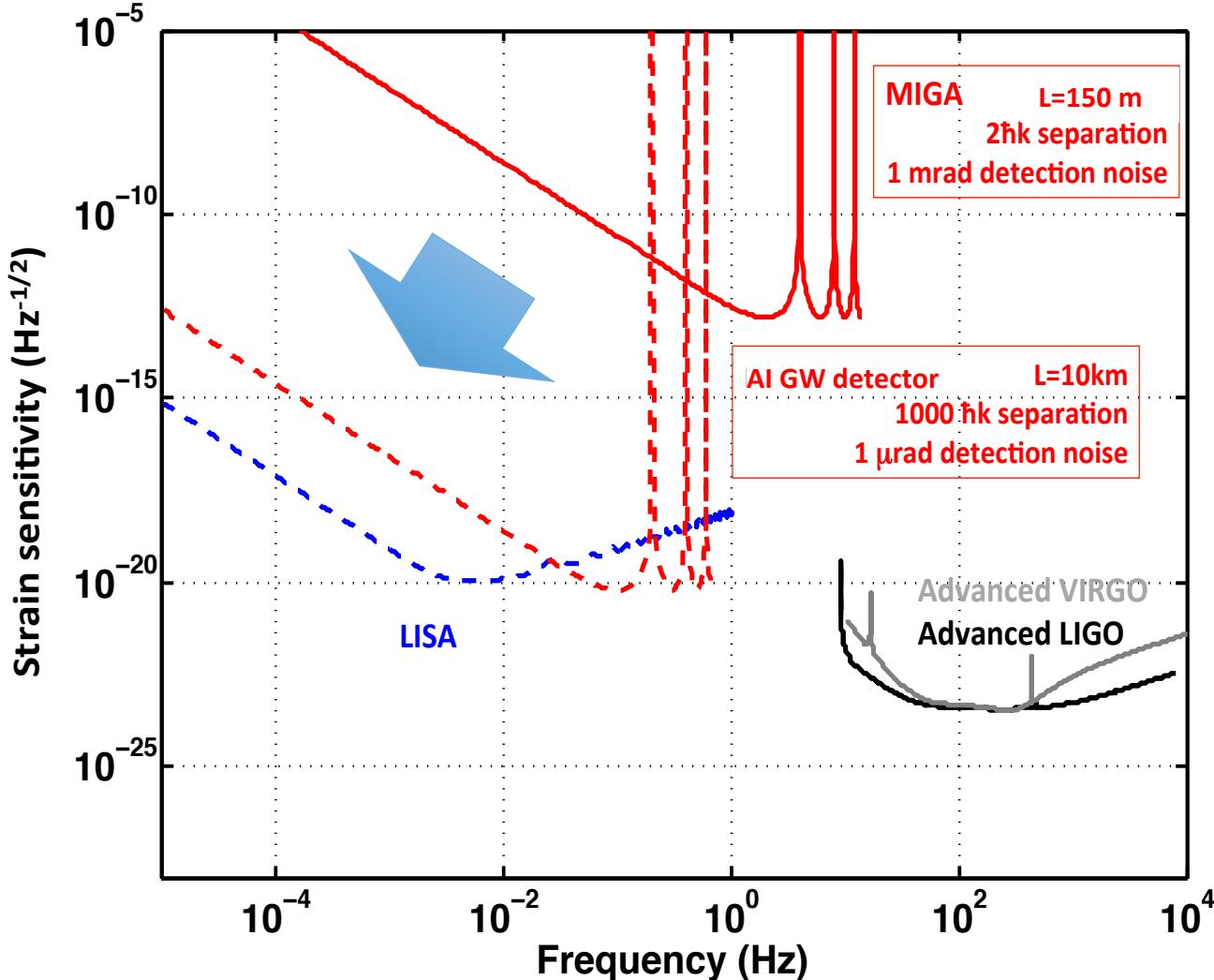
- Demonstrator for future sub-Hz ground based GW detectors
- Geoscience: gravity, gravity gradient for geology, hydrogeology



$$\Delta\phi_{at}^i - \Delta\phi_{at}^j \quad \left[\begin{array}{l} \bullet \text{ GW} \qquad \qquad \propto kh(X_i - X_j) \\ \bullet \text{ Gravity Gradient} \propto 2kT^2 [a(X_i) - a(X_j)] \end{array} \right]$$

Questions, Perspectives

- MIGA: Initial strain sensitivity $2 \cdot 10^{-13}$ @ 2 Hz



Challenge for atom optics

- « LMT » techniques
- High atom flux $10^{12}/\text{s}$

and

Technical noise reduction:

- Frequency noise
- Residual seismic noise
- Magnetic noise
- Wavefront, scattering

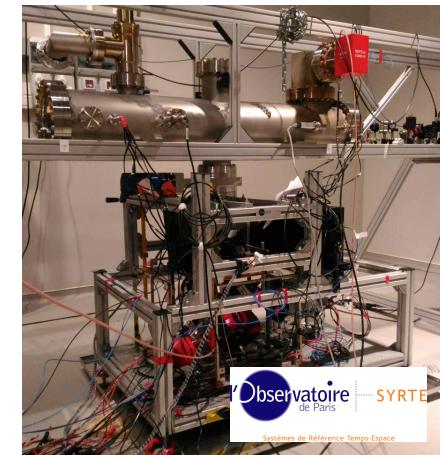
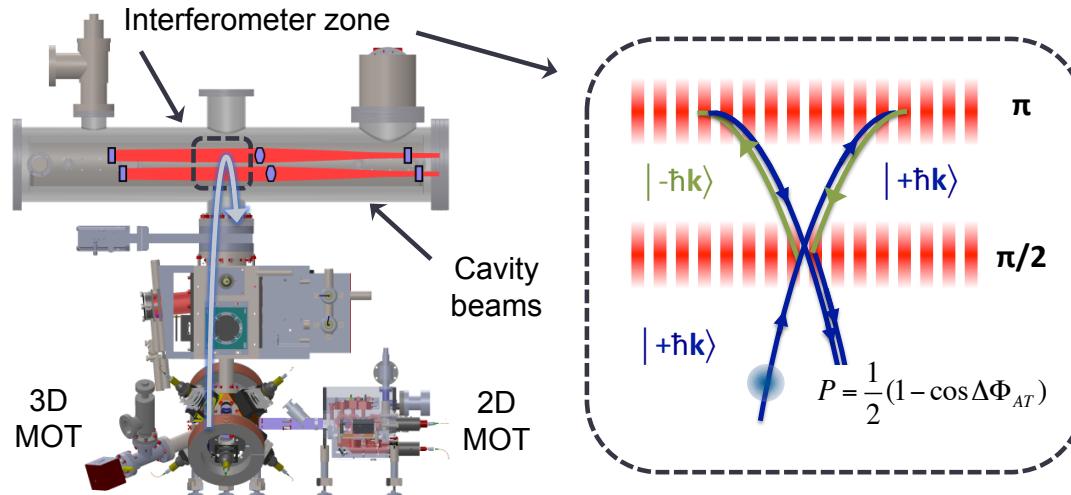
and

- Requires Advanced GGN rejection scheme

Status, Planning

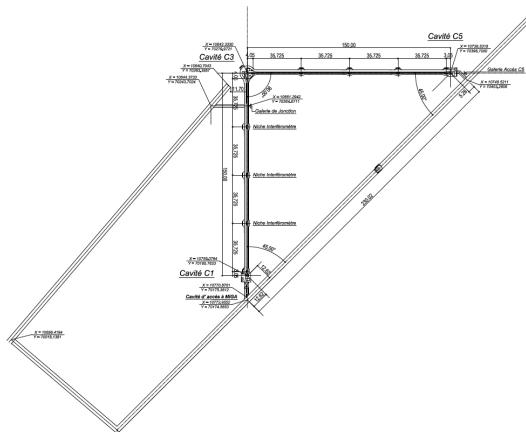
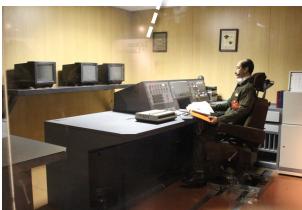
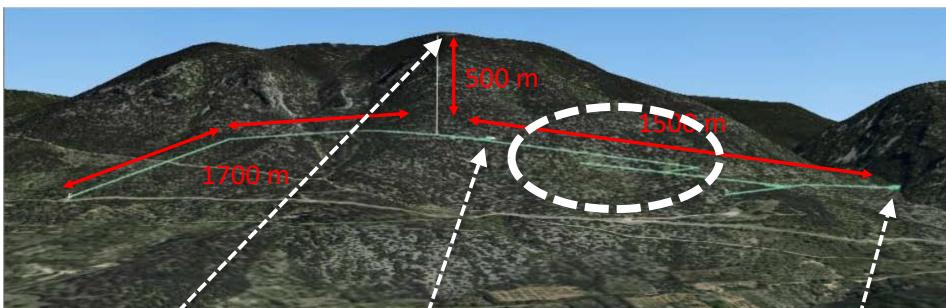


Groupement de recherche
Ondes gravitationnelles



Two other Al's in production to start assembling a reduced size antenna (10 m)

Infrastructure works



- Infrastructure works starting
- MIGA installation: end 2019
- Commissioning: start mid 2020