

# Matter wave interferometry for inertial sensing and tests of fundamental physics

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Today's state-of-the-art atom inertial sensors require improvements in stability and accuracy in order to fully exploit their potential with large scale factors on very long baselines on ground and in space, as well as in dynamic environments, e.g. for inertial navigation. We report on recent developments concerning the commissioning of the Very Long Baseline Atom Interferometry test stand. Stretching over 15 m, the facility with its high-performance magnetic shield, Rb-Yb atom sources, and a low-frequency seismic attenuation system will allow us to take on the competition with the stability of superconducting gravimeters with absolute measurements. By operating in a differential mode, we furthermore anticipate tests of the Universality of Free Fall at levels of parts in  $10^{13}$  and below [1,2].

We will moreover report on matter wave sensors enhanced with opto-mechanical resonators [3] as well as fully guided interferometry and discuss the potential of such systems in inertial sensing and fundamental physics.

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## References

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