Publishable Summary of MatterWave

Atom interferometers are amongst the most sensitive instruments. They can measure differences in acceleration[1] as small as 4×10^{-9} g $Hz^{-1/2}$ and rotations[2] of only 6×10^{-10} rad s^{-1} $Hz^{-1/2}$. The technologies of the free-space atom interferometer are well established. MatterWave's aim was to develop novel interferometer techniques in view of reducing the size of the interferometer in view of possible applications. A fully integrated and portable interferometer will make atom-interferometry available to real-world and hard-science applications. For the first time coherent matter-wave guides will be available for microchip atom interferometers resulting in an enormous increase in sensitivity and robustness for such devices. The final objective of the project was to identify and test the key technologies needed for the first *integrated Guided Matter-wave Interferometer on an atom Chip*.
MatterWave did succeed in demonstrating for the first time coherent guiding over macroscopic distances, a novel type of interferometer, and in addressing many of the technical challenges of guided matter-wave interferometry.
MatterWave's output will lead in due course to an interferometer for applications as diverse as covert navigation and geology. The key technological breakthrough achieved is the coherent guiding of matter-waves on an atom chip, realized with mobile technology.