



Non-destructive technique for measuring at the atomic scale

ICFO researchers present a quantum non-demolition measurement with a material object in *Nature Photonics*

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In an article published in *Nature Photonics*, researchers from the group led by Prof. Morgan Mitchell report the observation of a highly fragile and volatile body through a new quantum-mechanical measurement technique.

Researchers applied the so-called "quantum non-demolition measurement" to a tiny cloud of atoms. They were able to observe the spinning of the electrons in the atoms, and more importantly, the atom cloud was not disturbed in the process. It is the first time quantum non-demolition measurement has been demonstrated with any material object. The information obtained exceeds the "standard quantum limit", which quantifies the maximum amount of information obtainable with any traditional probing. Overcoming this limit provides rigorous proof of the effectiveness of quantum physics for measuring delicate

objects.

This new technique may improve the performance of measurements like gravitational wave detection, brain magnetic imaging, and other ultra-sensitive measurements.