# 'Quantum mechanical squeezing' enables quantum state atomic force microscopy

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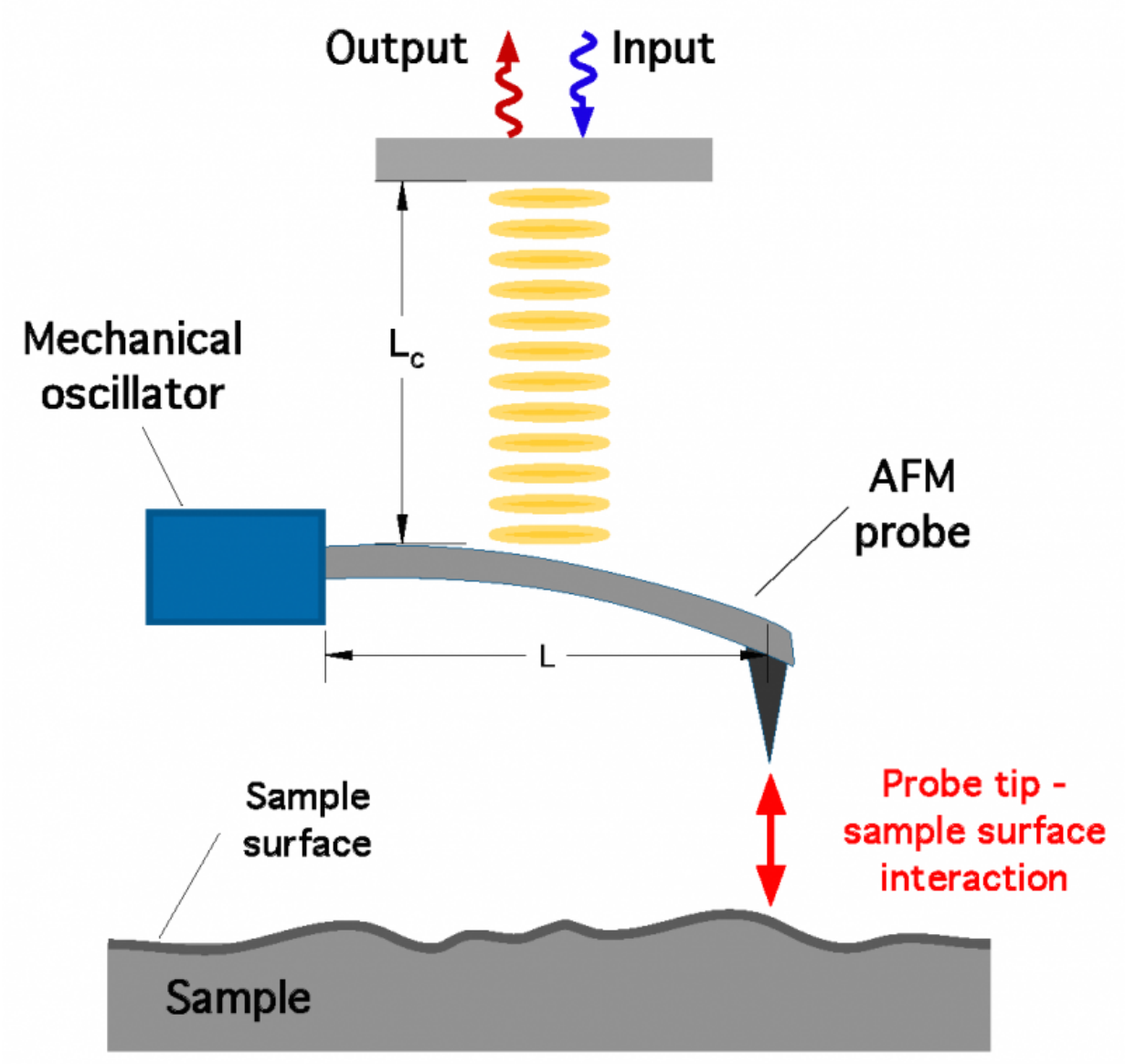

When two objects approach each other, an interfacial interaction force becomes significant. By using this force, one may utilize quantum effects to advantageously control the motion of the probe. Credit: Oak Ridge National Laboratory

By taking advantage of a phenomenon known as "quantum mechanical squeezing," researchers have conceptually designed a new method of applying atomic force microscopy. Ali Passian of Oak Ridge National Laboratory and George Siopsis of the University of Tennessee introduced a novel method of making measurements in a paper published in *Physical Review A*.

The technique, which they named quantum atomic force microscopy, has the potential to significantly increase the resolution of AFM. The method takes advantage of the fine interactions between the probe of the microscope and the surface of the sample to find the "sweet spot" where quantum effects stabilize the probe, resulting in more sensitive measurements.

"That's the theoretical prediction of this effect," Passian said. "Of course, the experiments will have the final say on how much better we can do, but the basic concept and theory are viable."

**More information:** Ali Passian et al. Quantum state atomic force microscopy, *Physical Review A* (2017). DOI: 10.1103/PhysRevA.95.043812

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