TECHNOLOGIC OFFER

A new paradigm to drive NC-AFM towards fast imaging

Reference	FAST-AFM [D01794]
Key words	ENGINEERED EXCITATION SUPER-FAST SCANNING

APPLICATIONS

- Non-contact Atomic Force Microscopy
- Room-temperature imaging
- Cryogenic environnement imaging
- High-speed, high-resolution imaging

TARGET MARKETS

- All users of NC-AFM

Technology readiness level

TRL 4

INTELLECTUAL PROPERTY

Working on a patent registration

LABORATORIES

- Laboratoire de Physique, ENS de LYON / CNRS / Université de LYON,
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DESCRIPTION

Non-contact atomic force microscopy (NC-AFM) is the highest-resolution imaging technique that exists today. Like every imaging approach, it is bound by a speed-spatial resolution trade off: in general, a precise detection takes time, and a fast detection is noisy. In particular, the force detection (implicitly in Hz) is done by a probe driven at resonance, which must oscillate "cleanly" (ie. have a high quality factor) to have a high spectral, and hence spatial resolution. This implies that the probe takes a long time to reach equilibrium, when passing from one pixel to the next. Let τ be of the time to detect a pixel (ms), and δF be the implicit force error (Hz), then a figure of merit of the detection is $1/(\tau\delta F)$. It is a hard upper boundary on the types of experiments possible, and a hard lower boundary on their cost.

With current instruments based on PLL, this figure is approximately $1/(\tau\delta F) = 0.3$. Our novel paradigm, with a very different approach to stimulus and detection, is based on the ESE protocol, achieving super-fast equilibration. We radically improve the possibilities of NC-AFM, achieving a figure of at least $1/(\tau\delta F) = 1.9$. In other words, we offer a six-fold improvement to the state of the art.

COMPETITIVE ADVANTAGES FOR AFM

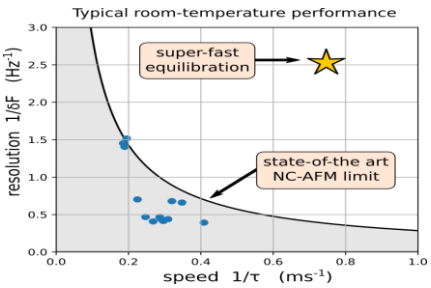
- For identical experimental parameters (cantilever, temperature, amplitude), 5 to 10 times faster than state-of-the-art
- Higher velocity reduces thermal drift artifacts
- No need to change existing probes, probe holders, sample holders, vacuum chambers, or piezo elements of the microscope.
- No need to use a PLL unit

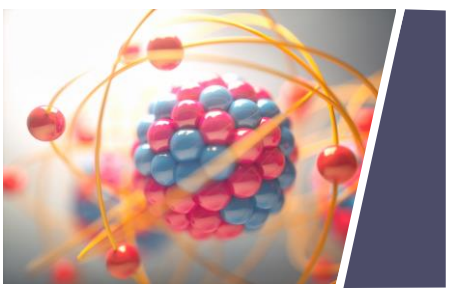
STAGE OF DEVELOPMENT

Working proof of concept prototype available

PARTNERSHIP TYPE

PULSALYS is looking for industrial partners for the commercialization of the technology.





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