

Meta-instrument

An opto-mechanical platform for imaging near-field optical instruments

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Publication date

2016

Document Version

Final published version

Citation (APA)

Bijster, R., Herfst, R., Klop, W., Hagen, R., & Sadeghian Marnani, H. (2016). *Meta-instrument: An opto-mechanical platform for imaging near-field optical instruments*. Poster session presented at 13th International Workshop on Nanomechanical Sensing, Delft, Netherlands.

Important note

To cite this publication, please use the final published version (if applicable). Please check the document version above.

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Meta-Instrument: An Opto-Mechanical Platform for Imaging Near-Field Optical Instruments



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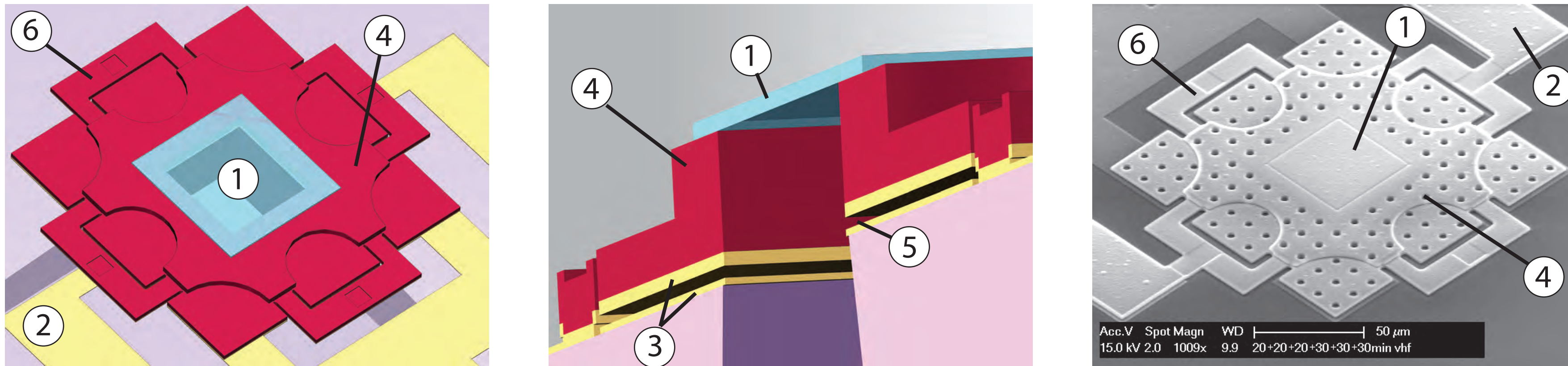
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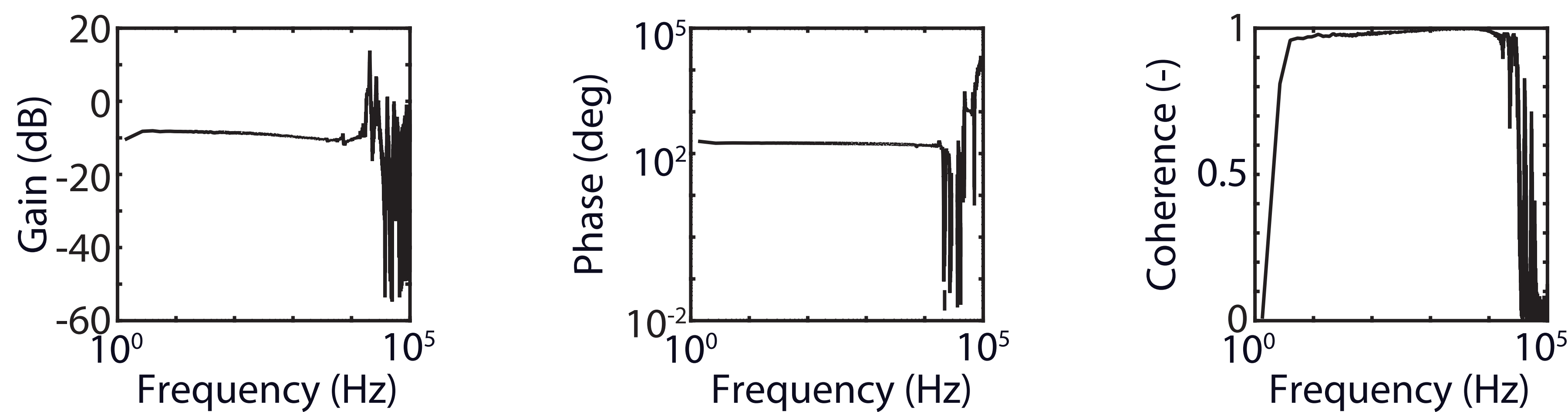
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Nanopositioning MEMS device (1) Transparent window, (2) Electronic leads, (3) Electrodes, (4) Moving plate (SiC), (5) Air gap of 500 nm, (6) Leaf springs

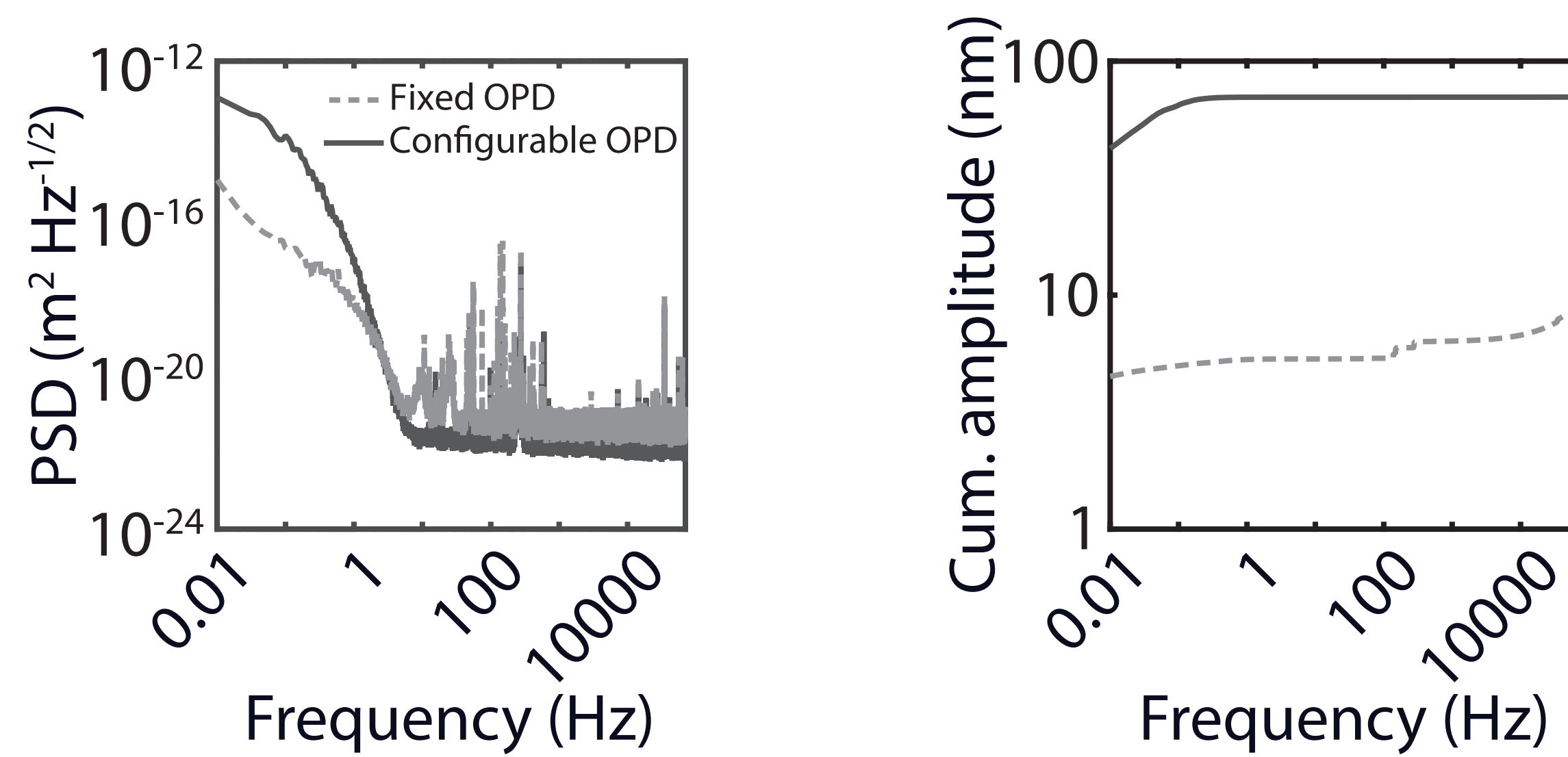


Fine positioning stage The stage and interferometers show a large signal coherence up to 10 kHz. This allows for a high bandwidth tracking of the sample.



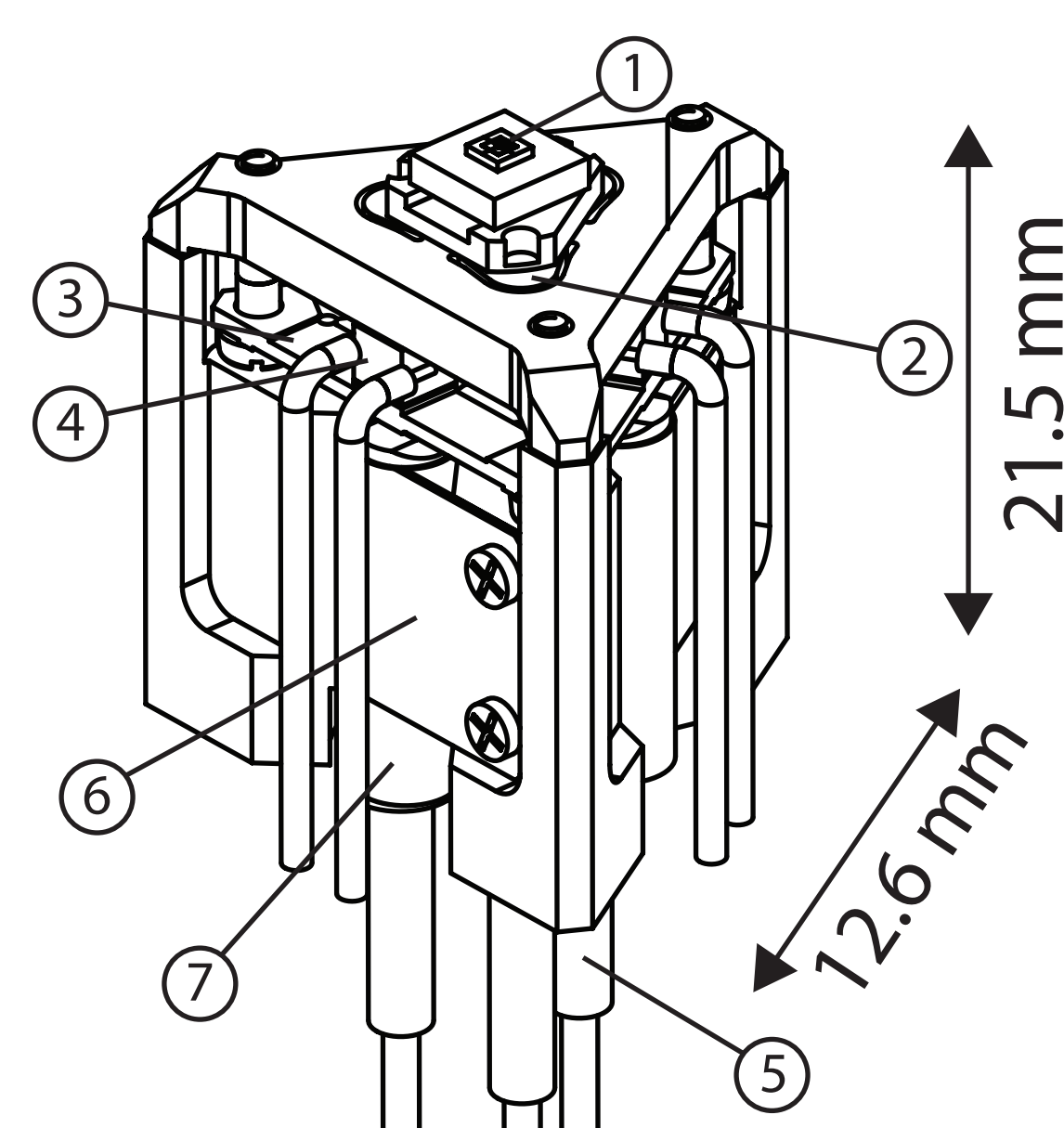
Fiber interferometers as distance sensors

Measure the motion of the finepositioning stage. By stabilizing the temperature of the optical path difference, the noise is reduced from 70 nm r.m.s. to 10 nm r.m.s. over 70 kHz.



Second generation

- (1) MEMS nanopositioning device
- (2) Mirror surfaces for interferometers
- (3) Leaf spring that preloads piezo element
- (4) Piezo element for fine positioning
- (5) Fiber interferometer
- (6) Leaf spring that clamps the carbon rod
- (7) Carbon rod of the coarse positioning



Combined fine and coarse positioning

The new linear actuator can be used for fine positioning and coarse stepping at 0.32 $\mu\text{m}/\text{step}$ and velocities up to 3.2 mm/s.

