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1fm/$\sqrt{}$Hz Noise Level Low Temperature Atomic Force & Magnetic Force Microscope (LT-AFM/MFM) in 20mK-300K Temperature Range OZGUR KARCI, UMIT CELIK, MUNIR DEDE, NanoMagnetics Instruments Ltd., AHMET ORAL, Middle East Tech Univ, NANOMAGNETICS INSTRUMENTS LTD. TEAM, MIDDLE EAST TECH UNIV TEAM — We describe the design of a new low temperature Fabry-Perot interferometer for LT-AFM/MFM operating in 20mK-300K Temperature range. We used a multilayer dielectric mirror coated optical fiber to achieve 1fm/$\sqrt{}$Hz Noise Level, while the shot noise limit was 0.16fm/$\sqrt{}$Hz. The fibre can be brought very close to the cantilever using a dedicated 2mm stroke piezo nanopositioner integrated in the piezo tube scanner. The same nanopositioner is used to park the fibre to a safe parking location during cantilever exchange. The LT-AFM/MFM can be used between 6 μW-3mW laser power. We have demonstrated performance of the LT-AFM/MFM by imaging a hard disk sample between 1.5-300K and Abrikosov vortex lattice in BSCCO single crystal at 4K.

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