

Abstract Submitted  
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**A New Ultra-Low Temperature, High Magnetic Field STM in an Ultra-Quiet Laboratory** BRIAN B. ZHOU, SHASHANK MISRA, LUKAS URBAN, JUNGPIL SEO, ANDRAS GYENIS, Princeton University, SEJONG KAHNG, Korea University, ALI YAZDANI, Princeton University — We report progress in the construction of a new UHV STM capable of operating at the extremes of temperature (25 mK) and magnetic field (14 T), allowing atomically resolved studies in previously unexplored areas of phase space. Our novel design is based on a bottom-loading dilution refrigerator in which the entire dilution stage and mounted microscope are moved between measurement and sample transfer positions. Pumping for the dilution fridge and large magnetic fields introduce demanding challenges in vibration isolation, which we have addressed with an ultra-quiet laboratory setting and rigid microscope design. Our system is situated inside both acoustic and RF-shielded enclosures in complement with various stages of isolation for both pump and ambient vibration sources. We will discuss unique aspects of the microscope design, such as a two-in-one double sample holder, and assess preliminary system performance. Supported by the W. M. Keck Foundation. Infrastructure at Princeton Nanoscale Microscopy Laboratory is also supported by grants from DOE, NSF, and ARO.

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