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Progress on the Creation of a High-Brightness Ba^+ Focused Ion Beam (FIB) Using Transverse Laser Cooling TRUMAN WILSON, JABEZ MCCLELLAND, Center for Nanoscale Science and Technology, National Institute of Standards and Technology — Focused ion beam (FIB) systems have a wide range of nanotechnology applications including high-resolution imaging and nanofabrication of materials. To meet a growing demand for improved FIB performance, new sources that take advantage of laser-cooling of atoms have recently been introduced. In this poster, I will present our progress towards the creation of a laser-cooled focused ion-beam source using $^{138}Ba^+$. Ba^+ is created by surface impact ionization of Ba vapor on a heated Ir target. These ions are then extracted to a region where we can apply laser light transverse to the direction of the ion beam propagation tuned to the Ba II cooling transitions at 493.4 nm and 649.9 nm. By laser cooling transverse to the ion beam, it should be possible to create a FIB source with a brightness that exceeds that of the Ga^+ source used currently for many nanotechnology applications. It may also be possible to counteract some of the heating effects of Coulomb interactions, allowing higher beam currents. If successful, this technique could open the possibility of a new class of FIB sources using ions that can be effectively laser-cooled.

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