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**Gold coated nano gratings for atom optics** VINCENT LONIJ, JOHN PERREAULT, University of Arizona, Tucson, OLEG KORNILOV, Max Planck Institute, Goettingen, ALEX CRONIN, University of Arizona, Tucson — The Van der Waals (VdW) interaction between neutral atoms is important to the dynamics of mechanical systems on nanometer scales. We used diffraction of sodium atoms from nano gratings to measure the Van der Waals potentials for atoms and different surfaces with improved precision. Atoms passing through the grating acquire an additional phase shift due to the attractive potential between the atoms and the grating bars, causing the diffraction pattern to be modified [1]. Previous measurements reported the VdW coefficient for sodium atoms and a silicon-nitride(SiNx) surface [2]. In our experiment we used a SiNx grating coated with a 2 nm layer of gold and we were able to measure a 40% increase in the VdW coefficient due to the gold. We also improved precision by combining results from the sodium diffraction experiment with results from a diffraction experiment with helium atoms on the same gratings.

[1] R. E. Grisenti, W. Schollkopf, J. P. Toennies, G. C. Hegerfeldt, and T. Kohler. Phys. Rev. Lett., 83(9):1755, 1999.

[2] J. D. Perreault, A. D. Cronin, and T. A. Savas. Phys. Rev. A, 71(5):053612, 2005.

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