Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Neutral Atom Microscopy: A New Surface Imaging Probe PHILIP WITHAM, ERIK SANCHEZ, Portland State University — Recent advances have made microscopy using scanned neutral atom beams a practical reality. This technique is also called Atomic DeBroglie Microscopy, Neutral Beam Microscopy, and Scanning Helium Microscopy. Using thermal energy (under 70 meV) gas particles with neutral charge results in a probe beam that scatters from the first atomic layer of samples, with little chance of beam damage. The technique presented eliminates any need to focus the beam by using an aperture in close proximity to the sample, and has produced the first published images from gas scattering. Resolution has reached 0.6 μm and much higher resolution is possible[1]. Now that NAM is a reality, a great deal of research can be done to show what it is uniquely useful for, and to explain the image contrast mechanisms. Molecular beam experiments show a wide range of surface properties that may be possible to image with such a microscope, some that are difficult to see otherwise. For example, thermal helium has a strong scattering interaction with surface hydrogens. Imaging un-coated surfaces with high electric fields is possible and imaging through high magnetic fields has been demonstrated. Recent image results and the basic instrument design will be presented.
[1]A simple approach to neutral atom microscopy, Rev. Sci. Instrum. 82, 103705 (2011)

Philip Witham
Portland State University

Date submitted: 12 Nov 2011 Electronic form version 1.4