

Atomic-scale Magnetism on a Complex Surface

– Barbara Jones, Almaden Research Center, IBM



SEMINAR
WEDNESDAY
MARCH 11
600 LINDY BOGGS
TULANE
3:00 PM

We will describe and analyze the unusual magnetic properties of transition metal atoms on complex surfaces. In collaboration with IBM Almaden's Scanning Tunneling Microscopy team, we use DFT+U to calculate the properties of transition metal atoms on nanolayers of insulator on top of a metal such as silver. In this talk we report the results of detailed calculations of Mn, Fe and Co on MgO/Ag. MgO is a common spintronic insulator, but in a nanolayer on metallic Ag, its behavior is not that of bulk. We find that the magnetic adatoms have very different local spin and charge interactions with this surface, and compare these to other related systems. Using an onsite Hubbard U parameter which we determine from first principles, we are able to study the variability of the magnetic moment and nature of bonding. The magnetic adatoms affect the surrounding interface layer in unexpected ways. We are able to obtain interesting insights which help us understand how magnetism propagates along surfaces as well as between interfaces. These systems have potential for future spintronics or quantum computing.

Barbara Jones is the head of the Theoretical and Computational Physics Group at IBM's Almaden Research Center in San Jose, California. Prior to holding this position, she was Manager of Magnetic Materials and Phenomena at IBM. She received her PhD from Cornell University. Dr. Jones's research interests are in the interaction of magnetic and nonmagnetic materials, particularly at nanometer scales and low temperatures where quantum effects and strong correlations become important. She is the recipient of a TWIN award and a Fellow of the American Physical Society. She is on the editorial board of Physical Review X. In 1998 she helped found the APS/IBM Research Internship for Undergraduate Women. Dr. Jones has also served as vice-chair and chair of the APS Committee on the Status of Women in Physics and on the executive committee and as chair of the APS's Division on Condensed Matter Physics. She has served on the advisory committees of the University of California at Santa Barbara, Georgetown and Princeton Universities, Los Alamos National Laboratory, the National High Magnetic Field Laboratory, and Canada's TRIUMF and NSERC. She served as well as on the editorial board of Physical Review B, and as a Trustee and General Member of the Aspen Center for Physics. Dr. Jones's previous experience with the NRC includes her service on the BPA's Solid State Sciences Committee (now the Condensed Matter and Materials Research Committee) as committee member, vice-chair, and chair.

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LA Tech - 122 Nethken Hall, LSU - 1008B DMC, SUBR - 211 J.B. Moore Hall,
Tulane - 600 Lindy Boggs, UNO - 234 Liberal Arts Building, Xavier - 226 Qatar Pavilion.