Probing the f-state configuration of $\alpha$U and URu$_2$Si$_2$ with RXES

SCOTT MEDLING, CORWIN H. BOOTH, Lawrence Berkeley National Lab, RYAN BAUMBACH, ERIC D. BAUER, Los Alamos National Lab — We directly probed the electronic configuration of several uranium compounds using Resonant X-ray Emission Spectroscopy (RXES). Previous investigations by several groups into the magnetic properties of uranium compounds (such as URu$_2$Si$_2$) suggested that some are multiconfigurational. RXES is particularly useful for probing the configurations because measuring the energies of both the incident and scattered photons reveals information about both the empty and occupied electronic states. We collected data for several uranium samples ($\alpha$U, UO$_2$, and URu$_2$Si$_2$) which indicate that in some of these compounds the uranium is multiconfigurational, with a mixture of $f^1, f^2$, and $f^3$ occupancies. The degree of intermediate valence that this implies will be related to electronic and magnetic properties of the compound.

Scott Medling
Lawrence Berkeley National Lab

Date submitted: 09 Nov 2012

Electronic form version 1.4