# LIES, SEX AND HIGH-TEMPERATURE SUPERCONDUCTORS

Marshall Onellion

By studying high-temperature superconductors, scientists have learned a great deal both about Lineshape/Intensity EStimates (LIES), Superconductivity EXperimental methods (SEX), and the science involved in superconductivity. In 1986-1987, during the first wave of superconductivity synchrotron work, the highest energy resolution reported in condensed phase was 22 meV, by Steve Kevan in his studies of surface states. Now scientists are seriously planning for resolution below 5 meV. Experimental methods that were thought well understood for photoemission and photoabsorption, in particular lineshapes, the spectral function, and the initial state, have and are receiving a searching reexamination. Consequently, in addition to the science involved in superconductivity, the fundamental basis for several synchrotron techniques have been improved and/or reconsidered. In this talk, I concentrate on three case studies:

(1) The lineshape of a gold Fermi edge. What could be more boring? Come and see!

(2) How do you consider symmetry selection rules when the ground state is a superconducting condensate, not a single particle band state?

(3) Can we observe short-range electron-electron electronic correlation effects using synchrotron techniques? Yes! An example will be discussed.