

## **Hard X-ray Photoemission with Angular Resolution and Standing-Wave Excitation**

Charles S. Fadley

*Department of Physics, University of California Davis, Davis, CA 95616 USA*

*Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720*

Several aspects of hard x-ray photoemission that make use of angular resolution and/or standing-wave excitation are discussed. These include hard x-ray angle-resolved photoemission (HARPES) from valence levels, which has the capability of determining bulk electronic structure in a momentum-resolved way; hard x-ray photoelectron diffraction (HXPd), which shows promise for studying element-specific bulk atomic structure, including dopant site occupations; and standing wave studies of the composition and chemical states of buried layers and interfaces. Beyond this, standing wave photoemission can be used to derive element-specific densities of states. Some recent examples relevant to all of these aspects are discussed.