

On the Status of High Pressure Research

SYASSEN Karl

MPI für Festkörperforschung, D-70569 Stuttgart

The *structural properties* of solids are a central issue in synchrotron-based high-pressure research. Detailed structural information obtained by diffraction methods are the basic ingredient to understanding the behavior of dense matter. The structure-oriented research is in part characterized by a mutually stimulating relationship to density functional theory. The interest in exploring *elementary excitations* of solids under pressure using synchrotron radiation has grown steadily over the last decade. This route offers to overcome limitations in energy-momentum space, sample size, or pressure range, which may apply to the traditional methods of IR, optical Raman, or neutron spectroscopies.

After a selective review of recent advances in synchrotron-related high-pressure research, this talk will highlight applications of inelastic x-ray scattering in the spectroscopy of elementary excitations at high pressures. Examples will be from the areas of phonons and collective electronic excitations in metals and semiconductors.

Results reported here were obtained in collaboration with I. Loa, K. Kunc, A. Mermet, M. Krisch, G. Vanko, G. Monaco, and M. Hanfland.