

HIGH PRESSURE STUDIES OF NOVEL SUPERCONDUCTORS

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The phenomenon of superconductivity, in which certain materials develop a state of zero electrical resistivity below a critical temperature T_c , holds the promise of bringing forth a technological revolution in a diverse range of applications. However, despite more than a century of research, this promise has barely begun to be realized, largely due to the impractically low T_c values of all known superconductors. Efforts to discover new materials with ever higher T_c values have lead researchers to study increasingly complex materials, often composed of several elements. The astronomical number of possible compounds and structure types precludes a brute force survey of materials and leads to the need for guiding principles in the search for new superconductors. One of the most powerful of such guiding principles is that superconductivity is often found near the boundary of another phase, e.g., magnetic order, spin-density-wave, charge- density-wave, insulating state, etc. In this talk, I will discuss materials that we have recently explored in which superconductivity coexists or competes with another phase. I will also discuss the usefulness of experiments under applied pressure in learning about the optimal conditions for high superconducting critical temperatures and will describe high pressure experiments we have performed that span the range from kilobars (the pressure at the bottom of the ocean) to megabars (nearing the pressure at the center of the earth).

Condensed
Matter
Seminar

All interested
persons are
cordially
invited to
attend.