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Versatile high-pressure x-ray scattering system

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A versatile system, rated to 400 MPA, has been designed and used in a variety of elastic and inelastic x-ray studies. Sintered Be cells, volumes 15-30 mm^3, have been used. Pressure generation is through a diaphragm compressor in conjuntion with a thermal pressure generator. Pressure, *P*, is measure either by a Bourdon gauge, which can also serve as a ballast for constant pressure studies, or by a strain gauge, with sensitivity 0.01 MPa. Orientational flexibility for single-crystal studies is achieved through either a displex with special temperature control (10 mdeg down to T= 10 K) or a modified continuous-flow cryostat (100 mdeg down to 4.5 K). *P, T* sensitivity is sufficient to observe small changes associated with solidification, melting and solid-solid phase transitions. The system has very low background and is well-suited to studies of low intensity signals. It has been used for ^{4}He in studies of a) fcc lattice dynamics, b) fcc diffuse scattering, c) thermal defect properties, and d) inelastic scattering at 1.5 eV and 17 meV resolution, respectively, of electronic and phonon excitations in the hcp phase. Applications involving He as a hydrostatic medium in pressure studies of other systems are also possible.