

A High Pressure Macromolecular Crystallography Capability Developed at CHESS

X Huang¹, Z Wang², A Finke³, D Szebenyi⁴, Q Huang², S Gruner⁵, D Rai⁶

**¹Cornell University, ²Cornell University, Ithaca, NY, ³Cornell University, Groton, NY, ⁴MacCHESS, Cornell Univ, Ithaca, NY, ⁵Physics Dept. & CHESS, Cornell Univ, ⁶Cornell High Energy Synchrotron Source, Ithaca, NY
xh78@cornell.edu**

The Earth's biosphere exists at pressures ranging largely from 100 bar to several kbar, but the pressure effects on organisms in a very significant part of the biosphere remain very little understood. To leverage research in such a significant but unexplored territory, CHESS have recently combined a team effort and developed a crystallography capability, allowing one to measure pressure effects on biomacromolecules at the atomic level. Typically, the instrumentation includes several key components: 1) gas-driven membrane in-vivo DAC cell with an angular opening of 100 degrees; 2) double calibrated in-situ pressure technique with ability of controlling and measuring pressure at a fine step of 50 bars; and 3) synchronized experimental assembly; and 4) in-situ imaging system of small sample in DAC. All the components given above are built in an optical table, which can be rolled-in and rolled out of the ID7B2 hutch. Upon synchronization of the sample in DAC with X-rays and large area detector (e.g. Pilatus 6M), a full set of diffraction images for well resolving the structure can be collected from either a single or multiple crystals.