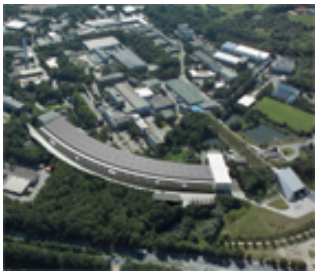

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Extreme Condition Research: State of the Art in Geophysics

Monday 18 May 2009 09:30 (45 minutes)

Mineral Physics is a dynamical field of research, but in many aspects our progression is limited by technology. Any improvement in experimental techniques, to which we participate actively, results in opening new windows to the Earth interior. We employ a great diversity of difficult experimental techniques; the 50μm diameter samples loaded between two beveled diamond anvils, advanced optical systems for laser heating, the hundreds of tones available in large volume presses, the many devices available on a synchrotron beamlines, for examples. In fact, there is an equilibrium between being a developer of scientific methods or an opportunist user that one should find, in our field, in order to obtain the most original results. For this reason, the most efficient research tools should be adaptable and evolutive.

In the past few years, rapid evolution of synchrotron beamlines and of all devices associated to it offered great opportunities to refine our knowledge on the Earth's interior. Various type of experiments can now be performed at higher pressures, higher temperatures, for sample compositions fully relevant to the Earth, in specific configurations with mixed liquid and solid phases, under controlled stress, etc: We can measure PVT equation of state up to more than 150 GPa and 4000 K, refine crystalline structure of new phases of a few μm3, probe the phase relations and determine phase diagrams in situ, etc.

Limitations remain, however, because our samples are very small, complex, and, on the other hand, we are greatly interested in resolving better the sample properties. Therefore, our field of research call for smaller probes, higher fluxes, better spectral resolution, etc. In this talk, I will present recent results that brought new views on the deep Earth's interior and that illustrate how important are the forthcoming improvements.

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