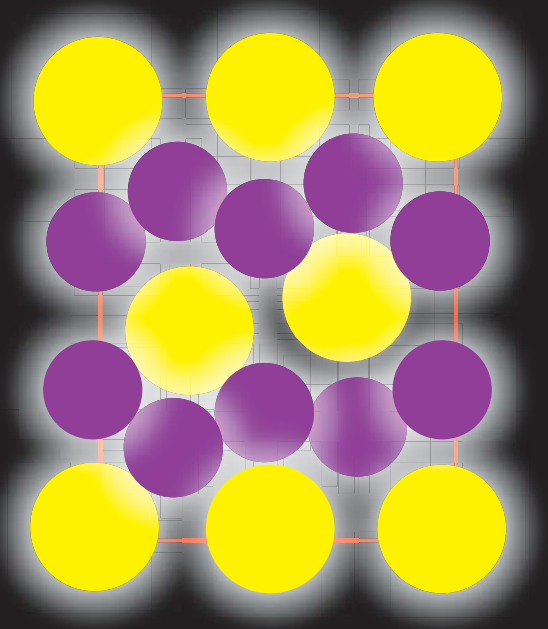
Peter S. Pershan

"The Structure of Liquid Surfaces"

Peter S. Pershan earned his Ph.D. at Harvard University in 1960 for nuclear magnetic resonance under the supervision of Nicolas Bloembergen. Along with Jens Als-Nielsen (Risø), Pershan developed the first synchrotron x-ray reflectometer for the study of the horizontal free surface of a liquid, and carried out the first synchrotron measurements on liquid surfaces at HASYLAB in 1982. The liquid surface spectrometers now at ChemMatCARS, CMC-CAT, μ-CAT, and the NSLS are all variations of the HASYLAB instrument. Since 1982 Pershan has led the field in exploration of such diverse liquid surfaces as superfluid 4He, H_2O, and liquid metals. Pershan began his career in nuclear magnetic resonance; however, before moving on to other things, he and Bloembergen produced some of the first papers on non-linear optics. He remained active in this field until the early 1980's when he wrote a book on liquid crystals and moved into the then-new field of synchrotron radiation. Aside from sabbaticals at the University of Paris, Bookhaven National Laboratory, and Risø National Laboratory Pershan has been at Harvard University (where he is now a faculty member) since he arrived as a graduate student in September of 1956.

Understanding of the solid surface can probably be dated to the development of electron spectroscopy in the 1970s. Fortuitously, this was same period during which the potential of synchrotron radiation for surface studies was realized. For example, in 1979 Marra, Eisenberger, and Cho proposed grazing incidence diffraction as a new tool for probing buried interfaces. This was only one of the developments that led to the studies of solid surfaces that have since been done at NSLS and APS. On the other hand, electron spectroscopy and other surface tools such as STM and AFM are not suitable for liquid surfaces and x-ray methods are the only way in which the liquid surface's molecular structure can be studied. This talk will first explain the difference between measurements of liquid versus solid surfaces, then describe examples of results on liquids, and conclude with recent results on liquid metal alloys that were obtained at the APS.



Wednesday, June 1, 2005
3:00 p.m.
Bldg. 402 APS Auditorium • Argonne National Laboratory

APS Colloquium