Mimicking Conditions at the Center of the Earth
360th Brookhaven Lecture

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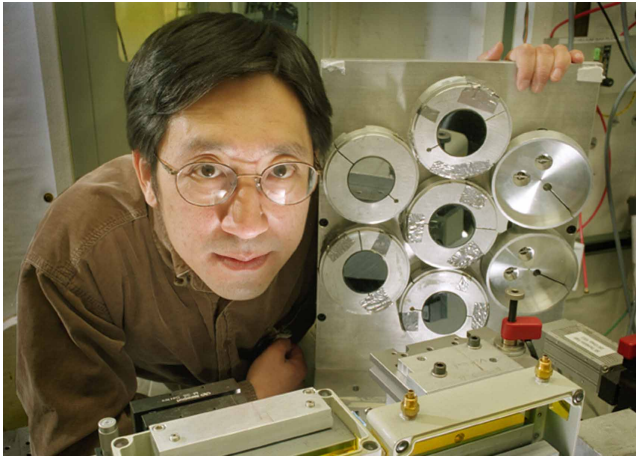
At the National Synchrotron Light Source (NSLS), researchers are using a newly modified instrument — a diamond anvil with a beryllium gasket — to exert high pressure on transition metals, such as iron, cobalt, and chromium, to study their electronic structure. To understand the geophysics of the earth, the scientists hope to mimic the conditions at the center of the earth, where such transition metals are under extremely high pressure.



Chi-Chang Kao, NSLS, studies the electron structure of transition metals using a newly modified instrument — a diamond anvil with a beryllium gasket.

Chi-Chang Kao, a physicist in the NSLS Department, will explain this research in more detail in the Brookhaven Lecture on Wednesday, January 31, at 4 p.m. in Berkner Hall. The title of the lecture is "A Softer X-Ray View Into the Diamond Anvil Cell: Electronic Structure of Materials Under High Pressure."

David Mao of the Carnegie Institute invented the diamond-anvil method in the 1960s, but, until this time, only high-energy x-rays or lasers were used for light source studies. With Mao, Kao recently designed a beryllium gasket for the anvil. Then, Kao and James Ablett, University of London, developed microfocusing optics to focus the x-rays into the diamond anvil cell.

These modifications to the diamond anvil enabled Kao to use softer x-rays for x-ray spectroscopy studies, thus enabling him to determine the electronic structure of the transition metals under high pressure.

A month after earning his Ph.D. in chemical engineering from Cornell University in 1988, Kao started as a postdoctoral research associate at BNL. He became an assistant physicist in 1990, associate physicist in 1992, and physicist in 1994. He was awarded tenure in 1997.

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