

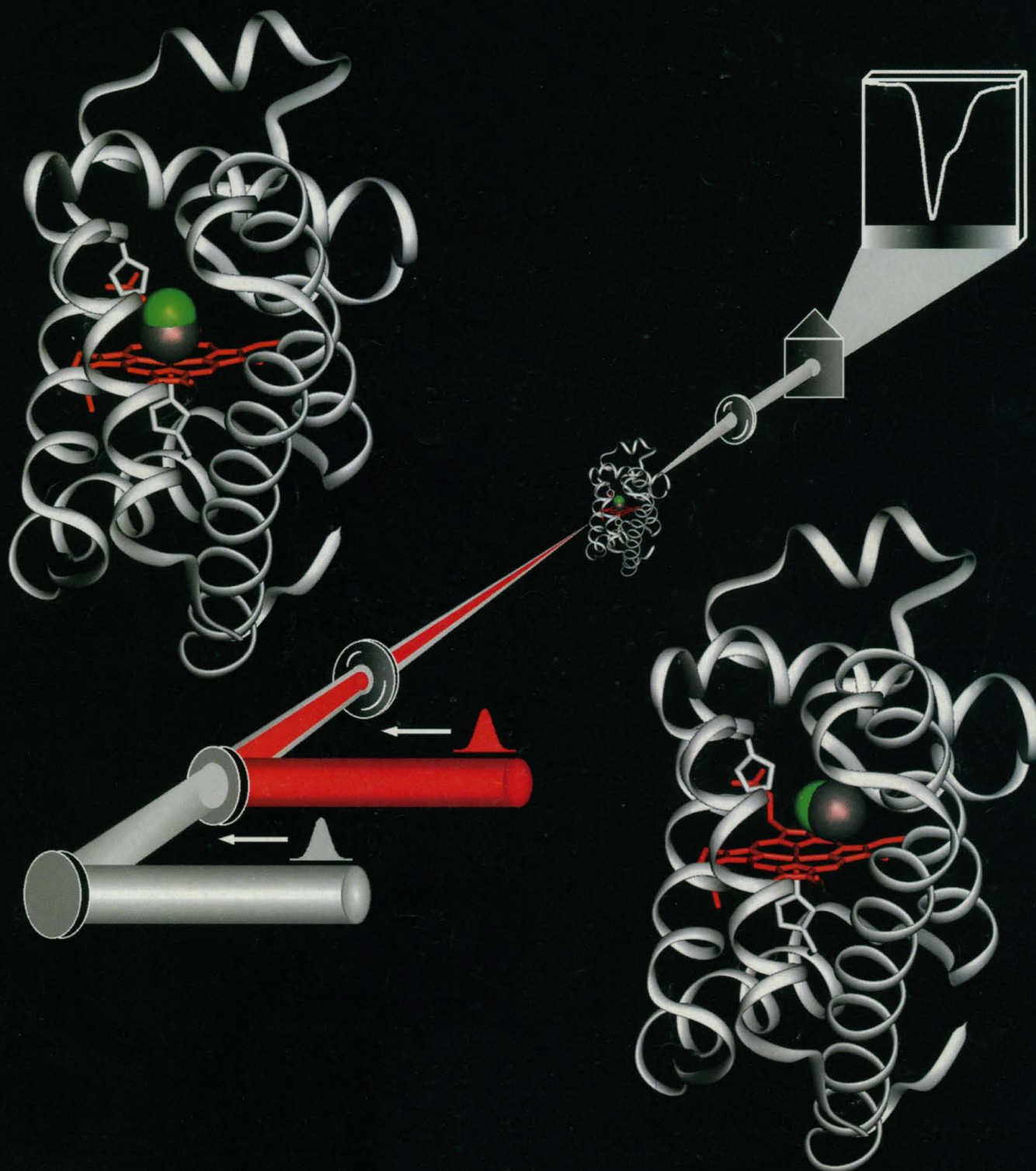


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18 AUGUST 1995
VOL. 269 • PAGES 893-1016

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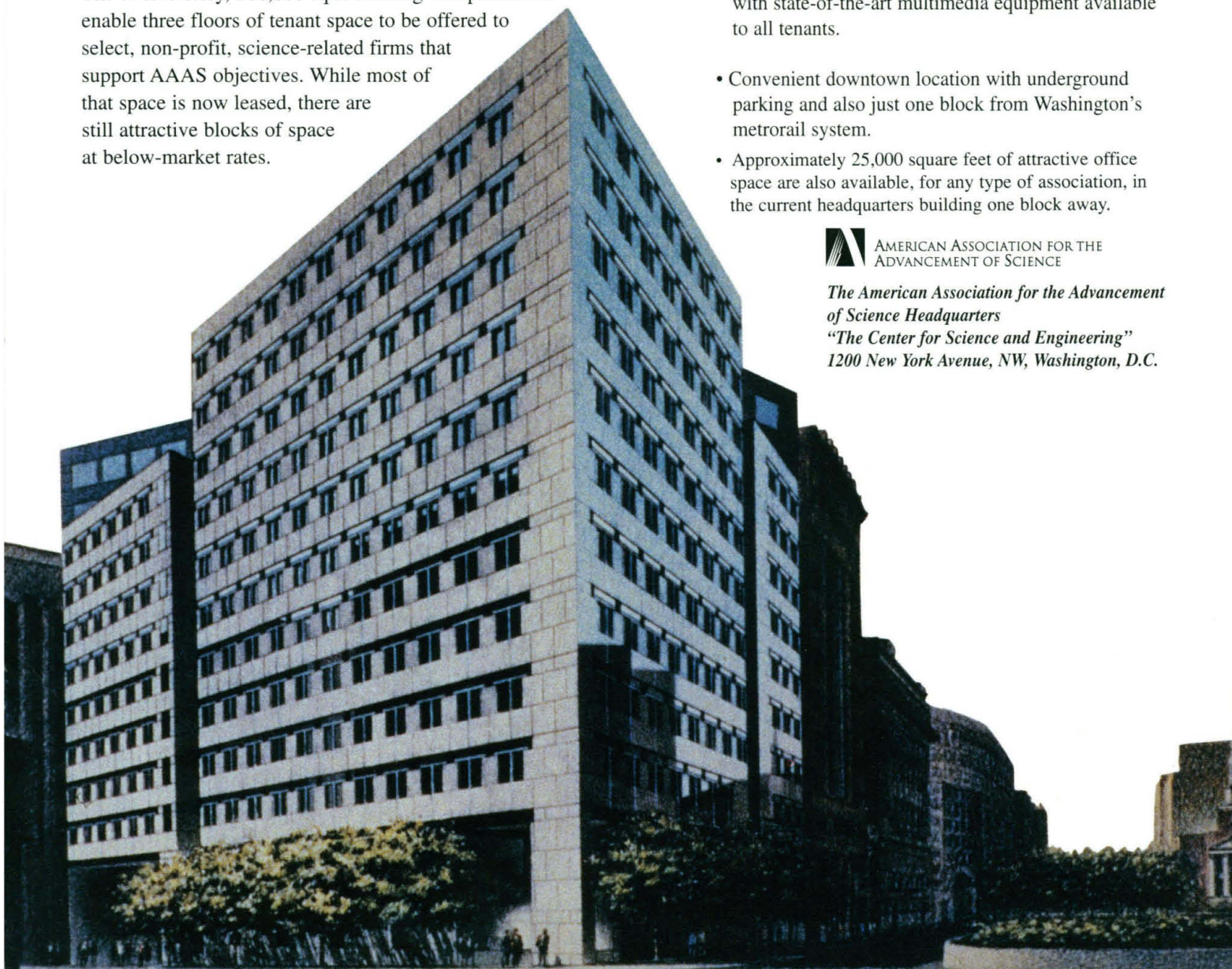
- Gas fired heating/cooling systems that exclude CFC's.
- Environment-sensitive design that includes operable windows.
- 180-seat auditorium and adjacent conference center with state-of-the-art multimedia equipment available to all tenants.
- Convenient downtown location with underground parking and also just one block from Washington's metrorail system.
- Approximately 25,000 square feet of attractive office space are also available, for any type of association, in the current headquarters building one block away.



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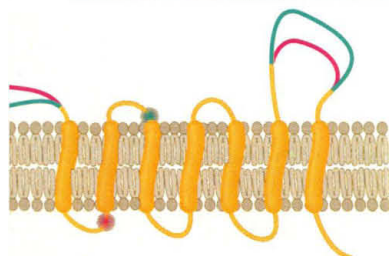
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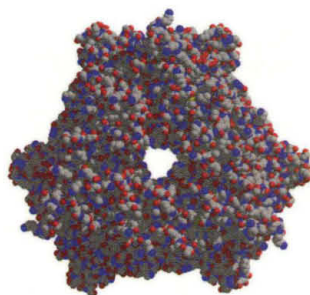


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Diagonally opposed images of carbon monoxide (CO) bound to (upper left) and photodissociated from (lower right) the heme in myoglobin. The orientation of CO was determined with time-resolved polarized infrared spectroscopy. As illustrated schematically, a visible laser

pulse (red) photodissociates the CO from the heme and an infrared pulse (gray), arriving 10^{-10} seconds later, probes the infrared spectrum of CO. See page 962 and the related News story on page 921. [Illustration: M. Lim, T. Jackson, and P. Anfinrud]



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Candidate Gene for the Chromosome 1 Familial Alzheimer's Disease Locus

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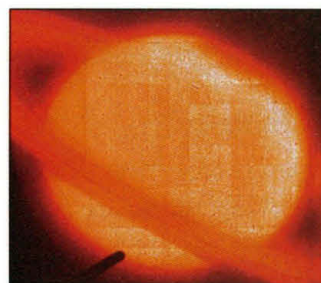
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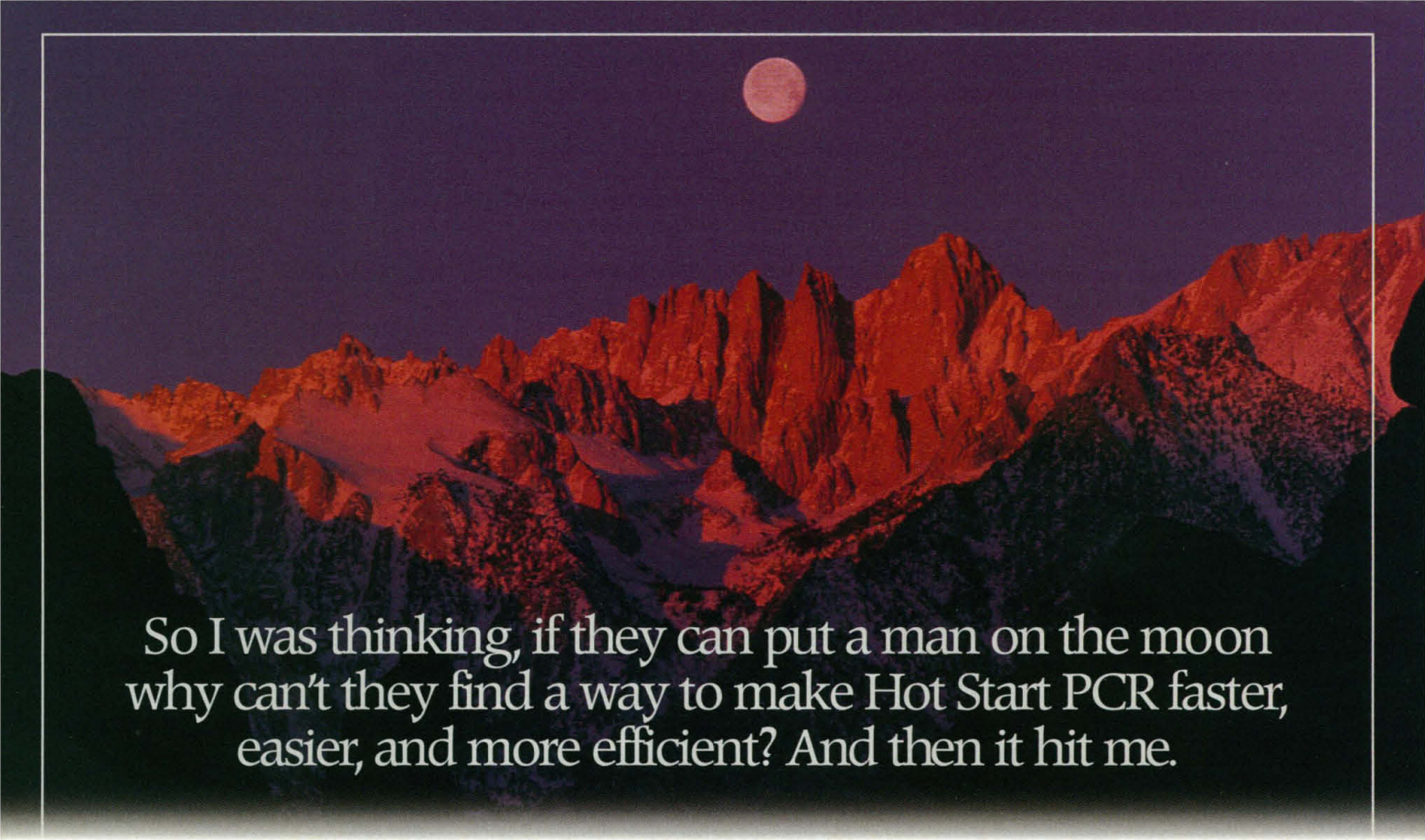
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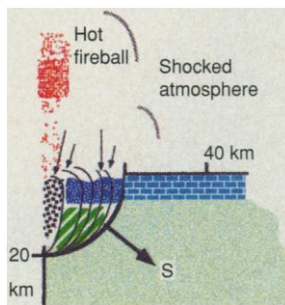
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Wide impact

A large impact at the Chicxulub crater is now recognized as the likely progenitor of iridium anomalies, shocked quartz, and other features seen at Cretaceous-Tertiary boundary. These features allow elucidation of the



dynamics of large impacts. The shocked quartz appears above the main ejecta layer in North America and is found preferentially west of, and in some cases surprisingly far from, the crater. Alvarez *et al.* (p. 930) present a model of the impact and suggest that it involved a hot fireball, an ejecta curtain of melt and other debris, and a warm fireball generated from devolatilization of carbonate rocks.

Down the side less traveled

The bacterial photosynthetic reaction center (RC) uses light to initiate electron transfer along a series of cofactors, a process that separates charges so that further chemical reaction can proceed. The L- and M-polypeptides and their cofactors that make up the RC are highly symmetric, yet electron transfer proceeds entirely down the L-side. Heller *et al.* (p. 940) constructed a double mutant of the photosynthetic reaction center of *Rhodobacter capsulatus* that incorporated an aspartic acid residue near the accessory bacteriochlorophyll of the L-side and also replaces leucine 212 of

Chromosome 1 and Alzheimer's disease

Different forms of early-onset Alzheimer's disease (AD), which develops before age 65, have been associated with genes on chromosomes 21 (amyloid precursor protein) and 14. Reports by Levy-Lahad and co-workers (pp. 970 and 973; see news story by Barinaga, p. 917) now show that the form of early-onset AD found in the Volga German (VG) kindred is associated with a candidate gene STM2 on chromosome 1 that has a protein sequence homologous to the chromosome 14 AD gene, S182. In the affected VG kindred, a point mutation from asparagine to isoleucine occurs at a residue that is conserved in human S182 and its mouse homolog.

the M-side with a histidine residue. In this mutant, 70 percent of the electron transfer still proceeds on the L-side, 15 percent occurs on the M-side, and 15 percent is deactivated. Single mutations can alter the free energies of the charge-separated states so as to redirect the electron transfer pathway.

A different angle

If the protein myoglobin did not discriminate between carbon monoxide (CO) and molecular oxygen, CO would be orders of magnitude more toxic than it is now. The relative orientation of the molecules bound to the protein myoglobin has long been believed to cause binding discrimination. Lim *et al.* (p. 962; see cover and news story by Service, p. 921) performed spectroscopic measurements in solution which show that the angle is $\sim 90^\circ$ for CO, suggesting that other factors must cause this discrimination.

Saturn's aurora

In its flyby of Saturn, Voyager I revealed an aurora around the north magnetic pole of the planet. Jaffel *et al.* (p. 951) report observations from the Faint Object Camera of the Hubble Space Telescope that confirm

this observation and show formation of aerosols in Saturn's atmosphere. This polar haze contributes to auroral activity.

At a standstill

During the mid-Cretaceous, about 120 to 100 million years ago, widespread and voluminous magmatism on the Pacific plate, perhaps related to a mantle plume, formed the Ontong Java Plateau. Tarduno and Sager (p. 956) used paleomagnetic data to show that during this time the Pacific plate was essentially at a standstill; spreading ridges surrounding the plate may have been fixed such that neighboring plates moved rapidly in directions away from the Pacific plate. The Pacific plate began to move rapidly poleward only after volcanism ceased.

Trapped proteins

At low temperatures, kinetic studies have suggested that proteins are frozen into conformational substates, corresponding to a "glass-like" transition in proteins. Hagen *et al.* (p. 959) show that solvent viscosity rather than internal energy barriers determines trapping of conformational substates, suggesting that the motions facilitating interconversion are global

in nature. Small but widespread motions of the protein molecule, which displace solvent, are likely to be suppressed by high solvent viscosity.

Avoiding overload

Most of the synaptic connections made by neurons in the primate cortex are excitatory, and most are made onto neighbor cells. How then is it possible to avoid triggering an explosive burst of activity with excitatory input to the cortex? Douglas *et al.* (p. 981) used anatomical data to conclude that many of these intracortical connections are recurrent, that is, reciprocal. By modeling this architecture as an electrical circuit, they obtain the stability conditions and explore the controlling effects of inhibitory neurons that enable directional selectivity in visual processing.

An objective view

Perception and action depend greatly on a frame of reference. In some cases of a condition known as visual neglect, patients with unilateral lesions are unable to attend to one side of an object even though the entire object appears in the visible side of the visual field. This behavior has suggested the existence of sensory and motor neurons whose activities would be defined in relation to coordinates centered on the object, rather than on the eye or body. Olson and Gettner (p. 985) have identified object-centered neurons in the supplementary eye field of the monkey cortex. These neurons were active during eye movements to one end (left) of a bar stimulus regardless of whether the eye movement was toward the left or right side.

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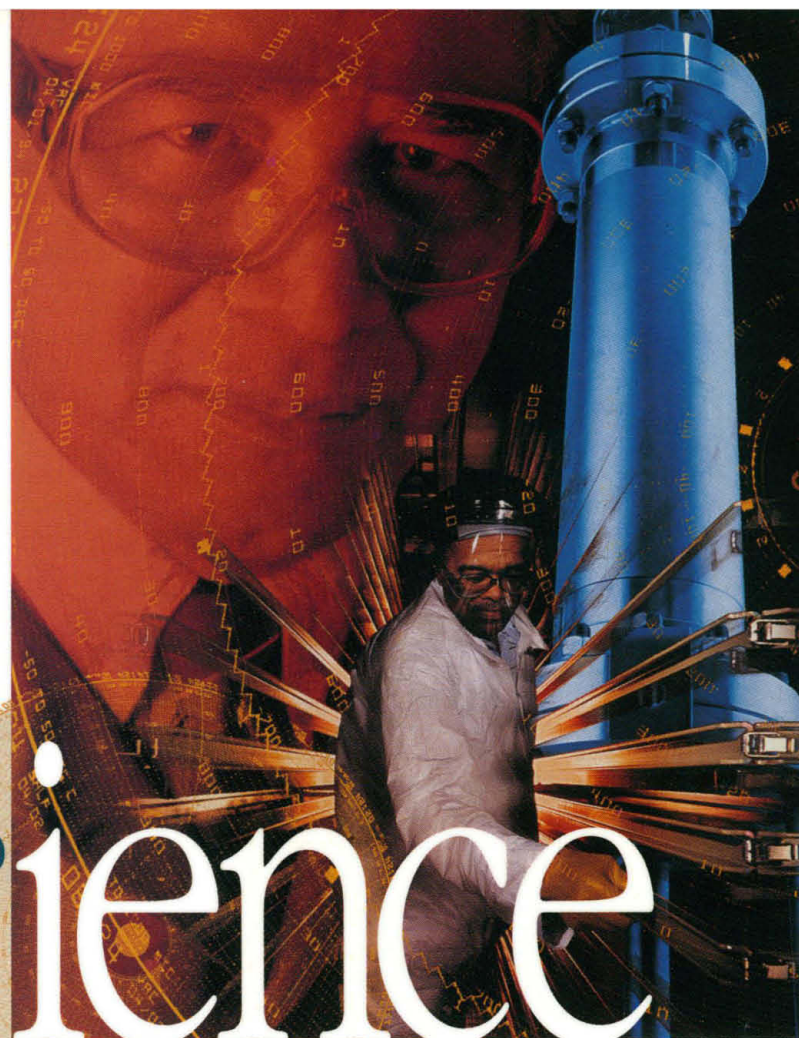
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