sweeps through its full mass-measurement range, the first direct samplings of a comet's composition.

Before and during ICE's encounter, attempts were also made to observe Giacobini-Zinner from at least three other spacecraft at widely differing locations: the International Ultraviolet Explorer circling the earth,the Pioneer Venus Orbiter (PVO) around Venus, and the latest member of the fleet bound for Comet Halley, Japan's Planet A, launched on Aug. 18. All (except ICE itself) were equipped to record Giacobini-Zinner's ultraviolet hydrogen emissions, promising measurements of how much water was actually coming off the comet due to the sun's heat.

The emissions appeared about twice as bright as expected, says Ian Stewart of the University of Colorado in Boulder, in charge of PVO's ultraviolet spectrometer. Combined with the data from ICE, he says, the result will be the first set of quantitative measurements linking a comet's sublimation (ice vaporization) rate with the ion densities and structure in its tail. The PVO instrument was able to monitor the comet for 10 hours, resulting in especially noise-free measurements and encompassing the whole span of ICE's visit.

There are no comet "experts" — far too little is known for anyone to merit such a term, even after ICE's pioneering visit. But according to John C. Brandt, chief of Goddard's Laboratory for Astronomy and Solar Physics, "our concept of cometary physics has fundamentally changed as of Sept. 11, 1985." Added Scarf after the encounter, "It's been a long, wonderful night." —*J. Eberhart*

Giant telescope begun

Construction of what will be the world's largest telescope began with a groundbreaking ceremony Sept. 12 on the summit of Mauna Kea on the island of Hawaii. The instrument, to be known as the W.M. Keck Telescope, will have a mirror 10 meters in diameter. The world's largest telescope now is a 6-meter mirror in the Soviet Union.

The Keck telescope will have a radically new design. Its mirror will be built of smaller segments, each with independent support and positioning control. (Manufacture of a monolithic 10-meter mirror is considered impractical.) The design is largely by astronomers of the University of California. The California Association for Research in Astronomy, which represents the University of California and California Institute of Technology, will build the new telescope. The cost of construction, about $87 million, will be supplied by Caltech in Pasadena, mainly from a grant by the Keck Foundation of Los Angeles. The 13,000-foot Mauna Kea offers some of the best astronomical seeing in the world. Housing several other telescopes, its summit is fast becoming an astronomers' acropolis. □

Viral close-up: In from the cold

The enemy might not yet be ours, but now we know what it looks like: Scientists have generated the first three-dimensional, atomic-scale model of a cold virus. The virus's structure makes development of a conventional vaccine unlikely, says research head Michael G. Rossmann of Purdue University in West Lafayette, Ind., but it does suggest other ways to prevent colds.

The collaborative effort between scientists at Purdue and the University of Wisconsin in Madison was reported in the Sept. 12 NATURE. It is the first three-dimensional description of a virus that infects animals.

The virus depicted, one of more than 80 members of the cold virus family, looks like a 20-sided soccer ball; within the ball is an RNA core. Each triangular face is made of protein and has hills and a valley. Within each valley, Rossmann believes, is the apparatus with which the virus grabs on to a host cell; the ridges are the sites recognized by the host's immune system.

This shape makes the cold virus a survivor and is a major roadblock to a vaccine. The constantly exposed ridges are constantly changing, allowing viral descendants to sneak unrecognized past an immune system primed to recognize previous versions of the virus. And antibodies can't fit into the valleys in which the stable receptors reside.

But the fight is far from lost. "We might be able to do something with the [host cell] receptor," says Rossmann. "The virus has to be able to infect the host." If something can be found to cover the host cell receptor, he suggests, infection could be prevented.

In a commentary in the same issue of NATURE, Don C. Wiley of Harvard University cites the viral description as "a *tour de force* of modern X-ray crystallography." It is, he notes, "certainly nothing to sneeze at."

Wiley suggests three approaches to a cold preventive. Like Rossmann, he proposes blocking the host cell receptor; his other suggestions concern the virus's protein coat. The virus has to get undressed — lose its shell — to enter the cell, and understanding the structural changes involved may suggest a way to block the disrobing, he says. In order to leave a cell following replication and infect another cell, the virus has to assemble a new coat; a better understanding of this process could provide information necessary to keep viruses from getting dressed.

The researchers marshaled Purdue's Cyber 205 supercomputer and Cornell University's high-energy synchrotron in their attack on the virus. They hit crystallized cold viruses (SN: 3/12/83, p. 165) with X-rays from the synchrotron and studied the diffraction patterns with the computer; the resulting map has a margin of error of about one-half angstrom. Approximately 6 million pieces of data were considered. Doing the calculations without a supercomputer could have taken 10 years instead of a month, Rossmann estimates. He says the same procedure could be used to study the AIDS virus, provided it can be crystallized.

The structure, the researchers note, is remarkably similar to those of previously described plant viruses and suggests a common evolutionary history.

— *J. Silberner*

Visa controls for supercomputer access

The Reagan administration appears determined to keep Soviet-bloc and Chinese researchers away from U.S. supercomputers. "It's fairly clear that there will probably be some kind of restrictions on access to supercomputers," says Charles H. Herz, general counsel for the National Science Foundation (NSF), reporting last week to the DOD-University Forum Working Group on Export Controls.

Department of Defense (DOD) officials argue that "high-end computing" is essential for many military and intelligence applications. Access to supercomputers like the Cray-2 could help the Soviet Union build its own machines and show Soviet researchers how to use them effectively. What's needed are "wise and prudent measures" that one would apply to any expensive piece of equipment, says George Menas of DOD's Strategic Trade Directorate. This can be achieved "without intruding on academic freedom," he says.

The debate focuses on four university supercomputing centers established earlier this year by NSF (SN: 7/20/85, p. 36). Recent discussions between NSF and the Department of State, which is responsible for coming up with a supercomputer access policy, indicate that visa restrictions are the favored control method. Visas for visitors from proscribed countries would clearly indicate whether the named visitor is allowed access to a supercomputer.

This approach, says Herz, takes the university out of the business of being an enforcer. However, federal officials hope that university personnel will voluntarily and informally cooperate by reporting individuals who violate the terms of their visas. Eventually, similar controls may be instituted for all U.S. supercomputer installations. —*I. Peterson*