Jupiter-bound Galileo starts with the sun

The Galileo spacecraft, launched Oct. 18 onto a complex course that will put it in orbit around Jupiter in 1995, wasn't scheduled to begin its scientific activities until next February. But the craft went to work early, analyzing a powerful solar flare only days after launch, in what space scientist Edward C. Stone calls "Galileo's first scientific result."

In addition to serving as project scientist of the Voyager 1 and 2 missions from the California Institute of Technology in Pasadena, Stone heads a team working with an instrument aboard Galileo. NASA added the device, called the Heavy Ion Counter (HIC), to Galileo's primary scientific payload to help track the craft's response to collisions with ionized sulfur and oxygen atoms trapped in the Jovian magnetic field.

Such ions are part of Jupiter's radiation belts, which are so intense that Galileo uses chips specially hardened against radiation to protect its microcircuits. The project's engineers hope such chips will prevent the ion bombardment from accidentally altering or damaging the settings of computer memories and other electronic components.

Most of the time, the HIC would be incapable of measuring the levels of charged particles coming from the sun, but lately the sun has been in the most active part of its 11-year cycle. The day after Galileo's launch, the craft encountered particles emitted from a major solar flare, which continued for several days and was strong enough for the HIC to detect a full range of particles. Though Galileo is dedicated primarily to planetary objectives, its initial scientific accomplishment gave scientists a detailed mass spectrum of the particles cast out from the sun's corona by the flare.

It was just luck that the flare occurred while Galileo was still close enough for its radio transmissions to be relatively strong, Stone says. Data from the HIC could be sent only during the flight's first 20 days. Keeping the device on duty longer would have required unfurling Galileo's umbrella-like high-gain antenna, a risky venture so close to the sun's heat. Instead, the high-gain antenna will remain closed until 1991 (making the HIC data available again), after the craft has swung around Venus and headed back out for the first of its two trips past Earth.

In addition to confirming that the device worked, the big flare provided an unscheduled but successful test for the hardened chips. Although the flare probably posed less hazard to Galileo than will Jupiter's radiation belts, both Stone and project scientist Torrence Johnson of the mission control center at Jet Propulsion Laboratory in Pasadena told SCIENCE NEWS they were pleased to find that the particle outburst neither permanently damaged the chips nor even once temporarily altered the settings that govern how they work. The researchers add that nonhardened chips might have suffered as many as a dozen permanent or temporary alterations, leading to potentially critical effects on Galileo's operations or scientific observations. — *J. Eberhart*

Enzyme suggests breast cancer spread

If high levels of an estrogen-induced enzyme show up in a surgically removed breast cancer, there's an increased chance the tumor has metastasized, spreading new growths elsewhere, a French study shows. Patients whose tumors contained high levels of the enzyme were three to four times more likely to develop a recurrence of the disease after surgery — despite follow-up chemotherapy — than women whose tumors had low enzyme levels, researchers report.

These findings hold out the prospect of better identifying which breast cancer patients face minimal risk of metastasis after surgery — and therefore have little need for follow-up chemotherapy. Today, the best gauge of whether a breast cancer will recur is evidence that it spread to the lymph nodes before surgery. However, because roughly 30 percent of women whose lymph nodes appear disease-free at surgery eventually develop metastases, the National Cancer Institute last year recommended that all breast cancer patients receive chemotherapy.

Reported in the Nov. 11 LANCET, the new study followed 122 French breast cancer patients for four to five years after surgery. Researchers with Centre René Huguenin in Saint-Cloud and INSERM in Montpellier found tumor levels of cathepsin-D, a protein-digesting enzyme, particularly useful in flagging the metastatic potential of breast cancers that had not yet spread to the lymph nodes, whether or not the initial tumors were estrogen dependent. Patients whose tumors had high cathepsin-D levels and whose nodes appeared disease-free at the time of surgery were seven to 10 times more likely to develop postsurgical metastases than women whose tumors had spread to the nodes before surgery but contained scant cathepsin-D. Thus, the enzyme proved a stronger indicator of future metastasis risk in these women than did their lymph node status, says study coauthor Henri Rochefort of INSERM.

Cathepsin-D does seem a "promising metastatic marker," says Lance A. Liotta, head of pathology at the National Cancer Institute in Bethesda, Md. However, he adds, it is but one of a growing number of tumor markers ushering in the new field of "molecular prognosis."

William L. McGuire, head of medical oncology at the University of Texas Health Science Center at San Antonio, says he thinks the enzyme will prove most useful when evaluated as part of a battery of diagnostic factors. McGuire, who recently completed a study of 199 breast cancer patients with disease-free lymph nodes, says he found cathepsin-D worked best as a metastasis marker when coupled with an analysis of the amount of DNA in the tumor. — *J. Raloff*

CF screen: Still too soon

Both the medical community and the general public rejoiced in August after learning that researchers had identified the gene responsible for most cases of cystic fibrosis (CF) — the most common lethal genetic disease of U.S. children. Before long, they were assured, the discovery would lead to genetic tests capable of identifying prospective parents harboring the gene and facilitating prenatal testing for the defect.

Sure enough, companies have begun advertising such tests — but their initial announcements may have overstated the tests' value, says Michael M. Kaback, a board member with the American Society of Human Genetics (ASHG). "It would be premature to go out and screen [widely] with a test that's this imperfect," he says. Kaback, a pediatrician at the University of California, San Diego, notes the test misses the 30 percent of cystic fibrosis gene carriers whose defect differs from the one so far identified, risking false reassurance.

Kaback told reporters at the ASHG annual meeting in Baltimore this week that Collaborative Research, a Bedford, Mass.-based biotechnology company, has sent letters to doctors suggesting it might be appropriate to begin offering the test widely. Instead, Kaback says, the test should be reserved mostly for prospective parents who know they have a close relative carrying the gene. Linda Pine, a spokeswoman for Collaborative Research, told SCIENCE NEWS that the letter is now unavailable and that the company is offering to perform the test but not specifically recommending it.

Francis S. Collins of the University of Michigan in Ann Arbor, who helped discover the CF gene with Lap-Chee Tsui of the University of Toronto Hospital for Sick Children, says two obstetricians have already asked him whether they'd be legally liable for not suggesting their pregnant patients get tested. Within two years, Tsui says, he expects to see a test capable of detecting 95 percent of CF carriers. — *R. Weiss*