

when the astronauts go up to save it. Riding close to Skylab in the space shuttle, the astronauts would use a remote-control system to send over a specially designed rocket engine, which in turn would dock with the workshop and be ignited to carry the huge facility up to a higher, longer-lived orbit. The remote-control rocket would do most of the maneuvering in such an operation, but Skylab would need some thrust to at least hold itself steady or make small corrections. Below the redline, engineers calculate, the exercise may be doomed from the start.

That particular problem, however, may never even have a chance to make a difference. A maneuver conducted on July 25 was successful at getting the workshop re-stabilized in a position calculated for minimum atmospheric drag — using 270 additional pound-seconds of precious thrust — but Kraft and other NASA officials think that Skylab is likely to reenter the atmosphere before the rescuers can get to it. Says Kraft, "We are going to have to live with the fact that Skylab is going to die a natural death."

It does not help any that the space shuttle continues to experience delays in its own test program, particularly with its large main engines. One of the most recent developed on July 18, when a single engine was being fired at full thrust on a test stand at the National Space Technology Laboratories in Bay St. Louis, Miss. Less than 42 seconds into a planned 300-second firing, a fire developed in the engine's liquid-oxygen turbopumps. There was "only minor damage" to the rest of the engine and to the test stand, says a NASA official, but it is one more worry in what is already the "pacing item" of the shuttle's delays.

With the odds so stacked against success — Kraft has estimated as high as 50 to 1 — the question has inevitably arisen of whether NASA might simply stop trying. In a recent television appearance, NASA administrator Robert Frosch said, "I think we should do what we can to prevent [the reentry] up until we arrive at some point where it is clear that we can't go on farther. If we are unable to hold Skylab in a low-drag condition — if we lose control of it — I think that might be a situation in which we stop."

Several NASA officials have said privately that they believe the chance of a piece of the reentering Skylab striking a person to be extremely — some say insignificantly — small. Small, but not zero. Some of the same officials, however, say that the odds of pieces reaching the ground (not necessarily hitting anyone) are extremely high. The workshop's outer skin will probably burn up, but there are, for example, the three gyro wheels, each weighing more than 100 kilograms of solid metal. A furnace used in materials-processing experiments has three-inch-thick titanium walls, and there are spherical gas bottles and other tough components that may not burn during reentry. □

PETRA storing beams six months early



Members of PETRA-project group gather around leader G.-A. Voss. Champagne waits on control console.

The first colliding beam facility for particle physics that was of a size worth thinking about was called Ada and was built at Frascati, a city previously famous for its wines. Its latest lineal descendant, PETRA, the most energetic electron-positron colliding-beam facility in the world, recently went into operation at the Deutsches Elektronen-Synchrotron (DESY) laboratory near Hamburg, a city previously famous for amusements other than wine.

The notion that accelerating two beams of particles and colliding them head on will deliver much more energy for the production of new particles and other effects than the other experimental technique, striking one accelerated beam against a fixed target, can be derived from very elementary physics. Making it work was difficult because the beams must be dense with particles, sharply focused and precisely aimed. To build up these qualities the beams must be held for a while in storage rings, which is the other usual name of this kind of facility.

Once the principle worked it was a smash. Most of the interesting physics reported in the last few years has been done at colliding-beam facilities, and there is

something of a breathless quality about the push for more energetic ones. PETRA, which will provide a total of 38 billion electron-volts energy compared to the maximum of 10 billion available in DORIS, the smaller electron-positron ring at DESY, was pushed to completion six months ahead of schedule (and within its budget). After the ring had been closed, the first stored beam was achieved at 10:15 p.m., Hamburg time, on July 15. Members of the PETRA-project group, which is led by Gustav-Adolf Voss, celebrated with the traditional champagne party in the control room. PETRA's American counterpart, PEP, will take a couple of years to finish.

A running-in period will follow. Experimentation is expected to begin in the autumn. So intense is interest in extending this kind of investigation to new energy levels that the number in line is large. A DESY announcement cites several hundred from all over the world including China, the United States and Japan. To quote the announcement, "For the first time in many decades Europe is able to provide its scientists with unrivaled facilities in a field in which the United States was traditionally leading." □

U. S.-Soviet exchanges hurt by recent trials

The climate for scientific cooperation between the Soviet Union and United States has turned very chilly. Largely responsible are the harsh sentences handed dissidents Anatoly Shcharansky and Aleksandr Ginzburg this month and Yuri Orlov in May. Although the U.S. science community has protested Soviet human-rights violations against dissident and Jewish "refusenik" (SN: 1/7/78, p. 7) scientists for several years, the Shcharansky trial escalated U.S. protest to a point that now threatens official government policy.

In a controversial and somewhat unexpected move, President Carter last week quashed the sale of a powerful computer to the Soviets and threatened to prohibit export licenses for "high-technology" oil-production equipment. In the past month Carter has also "postponed" indefinitely three separate, high-level government missions to Russia. One, a joint science and technology commission meeting orig-

inally scheduled for last week, would have involved the President's science advisor. All actions have been linked with the administration's dissatisfaction concerning Soviet attitudes and handling of the dissident trials.

In an informal congressional briefing last week, representatives of several large science organizations registered their concern over possible effects this new tack in government policy may have. Calling the recent trials a "profoundly offensive" spectacle, William Carey, executive officer of the 130,000-member American Association for the Advancement of Science, warned that any full-scale boycott of scientific exchanges with the Soviets would only further isolate repressed scientists. He and others suggested that the decision be left to individuals and organizations within the science community — not the federal government — as to what the extent of their cooperation will be. □