NOVA's beams and equipment from the Argus and Siva lasers — an experiment known as NOVETTE — operating with green light. This experiment will make it possible to test parts of NOVA before the full facility becomes operational, a cost-reducing exercise which, it is hoped, will please the sceptics at the Office of Management and Budget.

Contingency plans are also being made at the Los Alamos Scientific Laboratory, where the 35–40 kilojoule carbon dioxide laser ANTARES is due to be completed in 1983, and at Sandia Laboratories, where construction of the first phase of a new particle beam fusion accelerator has just been completed. Each of these programmes would be severely affected if the full cuts proposed by the Reagan Administration go through.

Given the political strength of the Armed Services Committee, and the general enthusiasm for military-sponsored research, it seems unlikely that the full cuts will, in fact, materialize. There is much enthusiasm for the military use of lasers among conservative Republicans, and the White House's National Security Council is studying a proposal for substantial increases in funding for a space-based, high-energy laser system, and has given support to a decision by the Senate to add \$50 million for research in this area.

A more likely casualty of the budget stringencies, however, is heavy ion beam research. From a purely technical point of view, many experts believe that the use of heavy ions to explode (or more accurately, implode) the pellets — as opposed to the light ions being studied at Sandia Labs — present engineering difficulties in designing a reactor. But heavy ions continue to suffer from two major drawbacks.

First, it would cost many hundreds of millions of dollars to build an experimental machine, expenditure that stands little chance of gaining federal support in the prevailing financial climate. And second, unlike either lasers or light ions, such technology has no potential military uses.

Support from the Armed Services Committee has ranged from lukewarm to frigid. And given its own priority of glass lasers, it has given heavy ions a firm thumbs down, not only supporting the Administration's decision to withdraw funding for this area of research (which received \$5 million in the current year), but adding explicit language in the authorizing bill forbidding the department to provide support from other funds.

Supporters of heavy ions had hoped that their cause would be strengthened by a review of ICF previously announced by the Department of Energy's Research Advisory Board (*Nature* 287, 573; 1980). But with the change in administration this review has been put on ice; and with both Congress and the Department of Energy now stressing that this principal interest in ICF lies in its military applications, the prospects for heavy ion drivers look increasingly bleak.

David Dickson

European space success

Ariane takes off

Kourou, French Guiana

Champagne corks were popping here last Friday after the near perfect third test launch of Ariane, Europe's hope for an independent satellite launcher. During the final countdown, tension was high amongst the largely French team of engineers who had worked to correct the fault in the first stage Viking engines that had led to the failure of the second test launch a year ago. They, at least, are now reassured that the earlier problems have been ironed out.

Lift off was at 12.33 GMT, 19 June, on the third countdown, about 1 hour 10 minutes later than scheduled. The first two attempts were abandoned after a marginal overload in the power supply to the third stage, and when two local radar stations failed to synchronize. In the event, the voltage tolerance was increased and only one radar station tracked the rocket during the first few minutes of flight. Preliminary analysis of data indicated that the trajectory and timing were on target and that the three payload satellites, Meteosat II, Apple — the Indian experimental communications satellite — and a technological capsule, were injected into a suitable geostationary transfer orbit.

Over the next few weeks, detailed analysis of flight data will reveal precisely how the first stage engines performed. The worry had been that high frequency combustion instabilities at 2,300 Hz and 2,700 Hz, which had resulted in the failure of the second launch, might recur. Although the mechanics of the instabilities, not uncommon in liquid fuel rocket engines, is not understood, the problem seems to have been solved largely by redesigning and increasing the size of the orifices in the hydrazine and nitrogen tetroxide fuel injectors.

With two successful test launches behind it, Ariane is now qualified for commercial operation, according to the European Space Agency (ESA). After the fourth and final development launch, scheduled to put ESA's maritime satellite, Marecs, into orbit on 10 November, commercial operation will be handed over to Arianespace, a consortium of European companies. The fourth development flight, which will launch within a particularly narrow window at night, will be a more stringent test of Ariane's capabilities than last week's exercise. Subsequent commercial launches will confirm whether the launcher achieves its design reliability of 95 per cent.

Confidence, however, is now such that work began earlier this week on building a second launch pad at Kourou, finance for which is expected to be approved by the ESA member states later this month. ESA is hoping that last week's success will prompt enough orders to fill the ten launch

per year capacity of the two pads. So far seven firm orders and fourteen reservations have been made, mainly for placing communications satellites into geostationary transfer orbit. The hope is that two or three more firm orders will be placed by the autumn and that several customers, including the Arab countries, which will want to launch two Arabsat telecommunications satellites in 1983 and 1984, and the Australians, will now be prompted to opt for Ariane rather than the United States space shuttle, which, despite its successful inaugural flight, still remains to be qualified.

Meanwhile, ESA's role in Ariane's development is not yet over. Work is under way on Ariane 2 and 3 with payload capacities of 2,000 kg and 2,400 kg respectively, compared with the present capacity of 1,700 kg. Hopes are now high within the Centre National d'Etudes Spatiales (CNES), the French space agency, that the ESA member states will be sympathetic to Ariane 4 with 3,500 kg or payload capacity. CNES is also planning to propose a partly reusable Ariane 5 later this year.

The success of the French ideas, however, will depend on how the other member states decide that ESA's budget should be spent over the next five years. Negotiations so far have ended in deadlock with the three largest contributors, France, Germany and Britain, wanting to go their own ways. But it is not surprising that after contributing more than 60 per cent of the money and effort spent on Ariane development, France has claimed the lion's share of last week's success and is particularly anxious that the programme should not stop there.

Judy Redfearn