be economically viable for fusion; the best hope among lasers is probably the krypton fluoride excimer laser, which has a wavelength of 0.25 micrometres and which has been developed since work on Antares and Nova began. Los Alamos has a small experimental krypton fluoride laser known as Aurora. Many now believe, however, that light ion beams will beat lasers to achieving plasma ignition. What might be the first machine to reach plasma ignition, known as Particle Beam Fusion Accelerator-2, will begin tests early next year at Sandia National Laboratory in New Mexico. **Tim Beardsley**

Proliferation

The atomic vapour laser isotope separation process (AVLIS), chosen by the US Department of Energy for separating the fissile uranium-235 isotope from natural uranium (see above), relies on selective three-photon ionization in an electric field, which sweeps out the ionized uranium-235.

Success depends on the relatively large (1 GHz) isotope shifts of spectral lines of the actinide elements on the low thermal velocities of such heavy atoms (implying reduced Doppler broadening) and the use of laser beams impinging perpendicularly on a collimated jet of uranium vapour (reducing Doppler effect still further).

In principle, the excitation could be effected in two steps, by a photon carefully tuned to an internal excitation and a photon of almost any wavelength to take the excited electron out to the continuum, leaving the atom ionized. But the ionization energy of uranium-235 is so high that the two photons would have to be at the blue end of the spectrum, where tunable lasers are expensive and where photons tend to degrade laser mirrors. So AVLIS uses instead two low-energy mid-spectrum photons, produced by a dye laser, to effect the finely-tuned selective excitation. A third ultraviolet photon is then used to take the excited electron far out into the continuum, where auto-ionization resonance increases the ionization cross-section tenfold.

The use of two successive excitation photons also has the advantage that each can be fired from different sides of the uranium jet, so that the first-order Doppler effects cancel. The Lawrence Livermore dye lasers are pumped by a high-efficiency high repetition-rate copper-vapour laser which has the advantage over continuous lasers of an extremely high average power.

According to one British laser physicist, such devices "could be run in a university laboratory" to separate kilogram quantities of fissile uranium-235. If a dye-laser system were established in Libya, for example, "it would be invisible", which is "why we're worried about them".

Robert Walgate

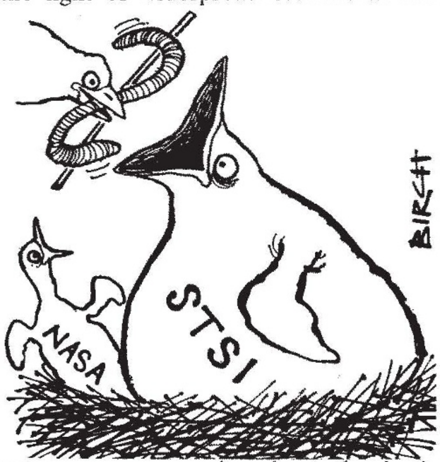
Hubble telescope

Space institute's wings clipped

Washington

A STUDY of the Space Telescope Science Institute (STSI) by a National Research Council task group has concluded that the ever-expanding institute should not be allowed to grow much beyond its present size. The study, which was commissioned by the National Aeronautics and Space Administration (NASA), says that new scientific functions required for the Hubble Space Telescope should instead be contracted to outside organizations, with STSI restricted to an advisory role wherever possible.

The task group undertook its study in the light of widespread concern in the



astronomy community about the institute's rapid growth since it was established in 1981. NASA originally planned an institute with a staff of 100 and an annual budget of less than \$5 million; STSI's budget for this year, however, is \$12.8 million and is expected to reach \$21 million by the end of the decade (at 1984 prices). The staff already numbers over 200 and is expected to top 250 before long. Some fear that the institute might squeeze out other NASA astronomy projects.

The task group, chaired by William Gordon of Rice University, agrees that NASA's original idea of having a special institute to manage science for the space telescope was a good one, and says the institute, which is based at Johns Hopkins University, has done a good job of surmounting the many unplanned technical obstacles that have beset the space telescope. But the task group euphemistically suggests that STSI's stated objectives should be modified by adding a requirement that STSI work "within available resources". What those available resources should be is not specified, although the task group notes that STSI was intended to be comparable in size with other ground-based astronomy facilities; that being the case, STSI is already close to the upper limit.

Gordon's task group also has some implied criticism for the Association of Universities for Research in Astronomy (AURA), the organization that is nominally in control of STSI. Gordon says that AURA should play a more active role in mediating in the frequent jurisdictional conflicts that have arisen between NASA and STSI.

Other recommendations include the suggestion that STSI develop remotely accessible data archives and software that can be run on computers at researchers' home institutions, to avoid pressure on computer time at STSI. The task group also says NASA and STSI should plan a joint public information service for when the telescope is operational. In the longer term, however, Gordon says it is up to NASA to make clear its plan for the future of the institute. **Tim Beardsley**

The report, Institutional Arrangements for the Space Telescope: A Mid-Term Review *is by the Committee on Space, Astronomy and Astrophysics, National Research Council, Washington, DC.*

East German physicist

Absence noted

AT a physics conference in Visby, Sweden, this month, Dr John F. Sharpey-Schafer from the University of Liverpool announced that his paper was dedicated to Dr Stefan Frauendorf of the Zentral Institut für Kernforschung at Rossendorf, East Germany. Dr Frauendorf had been invited to read a paper at the conference, but was arrested last November, and is now said to be facing charges of espionage, based on alleged contacts with West German intelligence services.

Dr Frauendorf had for several years been a regular visitor to the Niels Bohr Institute in Copenhagen, where he was working with several other scientists on a joint project on nuclear structure.

At the time of his arrest, he was in the process of reading and correcting a paper, written jointly with the Niels Bohr team, on high spin states. This paper seems to have disappeared at the time of his arrest and, as there was no copy, much work has had to be redone. A letter from the Niels Bohr Institute, enquiring about the paper and deploring the breaking off of collaboration with Dr Frauendorf, brought only the answer that the physicist was under investigation for espionage carried out over a number of years.

The Niels Bohr Institute has been working with Rossendorf for some 20 years, an association which has been especially fruitful over the past five years or so, roughly the period of Dr Frauendorf's visits. Cooperation arrangements have not been entirely broken off by the incident, however; three further visitors have arrived from Rossendorf since the scientist's arrest. **Vera Rich**