sible for negotiating the terms of the licence—a process which seems to take a very long time. Mr Duckworth told the sub-committee that so far none of the three agreements with the companies has actually been signed, an announcement which seems to have caused some concern.

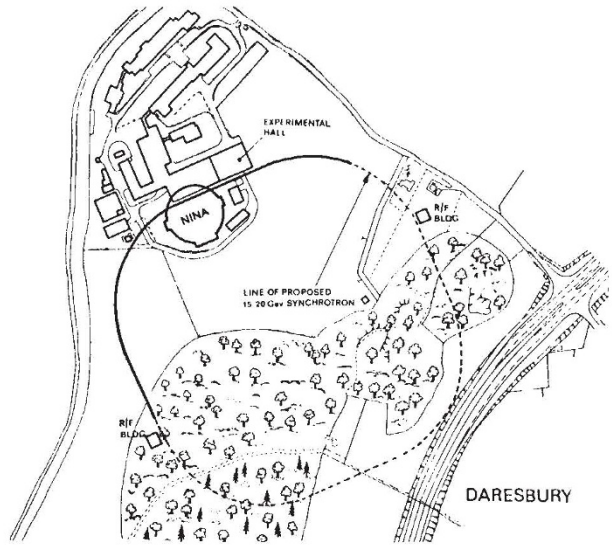
The most substantial of the sub-committee's recommendations is that a large plant for the production of carbon fibres should be built without delay. A plant producing 450 tons a year of carbon fibre should be built jointly by the three licensees, with government support if necessary. If the licensees are unwilling to go ahead, two other possibilities are suggested. One is that the NRDC should look for a further licensee who would be prepared to go ahead; the other, more unlikely, suggestion is that the Atomic Energy Authority should set up its own plant. This would, however, require legislation, so the sub-committee adds that "every effort should be made to ensure that the AEA has a financial interest in a large scale plant", whoever builds it. The sub-committee recognizes that there is a risk in going ahead with a plant "before demand materializes", but is convinced that the economies of scale would reduce prices so quickly that a large market would be created. It seems to have been particularly impressed by a study carried out by AERE Harwell which suggested that a plant producing 450 tons a year could bring costs down to somewhere near £5 per lb, or even less. Courtaulds was far less optimistic, suggesting a price of between £5 and £10 a lb ten years hence; the present price is about £100 per lb.

ACCELERATORS

Boosting NINA

It is hard to see what the Daresbury Nuclear Physics Laboratory expects to gain from the design study which it has been carrying out for a 15–20 GeV electron synchrotron. The scheme is attractive enough—it makes use of the existing NINA electron synchrotron at Daresbury (Lancashire) as an injector of 3 GeV electrons for the new machine, which would save nearly £1 million—but in the present climate it must be as obvious a non-starter as accelerator designers have produced for years. The plan has been on the stocks for some time now (*Nature*, **218**, 1095; 1968)—it was put forward first in a 1966 Daresbury internal report on large electron synchrotrons and then last year in an internal report narrowed down to the scheme involving NINA. But the genesis of the scheme was prompted by the success of the 20 GeV Stanford linear accelerator and the 10 GeV Cornell electron synchrotron, which made clear the need for a machine with the energy of the linear accelerator but with the better duty cycle of the synchrotron, and encouraged Daresbury to drop ideas of building high energy storage rings for NINA and to go in for electron synchrotrons instead. Daresbury has now published a preliminary design study of the work done since last year's internal report on what it calls the "NINA booster".

Two schemes seem to be open for the NINA booster. Both allow for a maximum energy of 20 GeV with a current of at least 1 μA and a duty cycle of more than 5 per cent, going up to 20 per cent if the electron energy does not have to be closely defined. The first and cheaper



One of the plans for the NINA booster. Dotted line denotes tunnelling.

scheme uses the present experimental halls, but unfortunately involves the new synchrotron cutting across the NINA ring. If the disturbance in the operation of NINA which this would involve is unacceptable, an alternative scheme is possible, but would require new experimental halls. Unfortunately, however, the Daresbury team do not consider in the report what is likely to be the biggest problem of all—where the money will come from. For, although the NINA booster is undoubtedly a cheap way of building a 20 GeV electron synchrotron, the basic scheme, providing 1 μA at 15 GeV, would cost £3·8 million, rising to £4·9 million for 3 μA at 20 GeV, and £5·4 million for the scheme involving least disturbance to NINA. Nor is it obvious how this preliminary study fits in with the SRC's manoeuvrings to join the 300 GeV project by running down the accelerators at Daresbury and the Rutherford High Energy Laboratory, and the intention to reduce the 40 per cent of its funds which goes to nuclear physics.

PHYSICS

Instruments on Show

from a Correspondent

Labour problems almost deprived participants in the 53rd exhibition of scientific instruments and apparatus at the Physics Exhibition this week of the benefits of electricity. Nobody will be surprised that the professional descendants of Faraday managed, for the most part, to mount their exhibits as planned. The Physics Exhibition is always interesting and often a scene of fascinating contrasts. There is something almost whimsical about displaying devices measuring a micro-this or a nano-that in the hall at Alexandra Palace. In the Scientific Instrument Manufacturers Association exhibit next door, incredibly sophisticated electronic hardware was being explained by demonstrators who were attempting to capture every erratic photon from the Calor gas radiant heaters mounted on obsolete porters' trucks.

The quality of exhibits was well up to the usual standard. If there is a dominant new theme in the