it should be taken seriously", says Glashow.

Glashow says he has been working in secret on his project for two years with Robert Wilson and two physicists at the European Centre for Nuclear Physics (CERN), Robert Charpak and Alvaro Derujula. They are planning to publish their plan soon. In his lecture, Glashow outlined three kinds of applications. The 10 TeV accelerator would have a circumference of 100 miles. In the search for oil,

code-named GENIUS (for Geological Exploration by Neutrino-Induced Underground Sound), the proton beam would be used to generate neutrinos in a tunnel approximately four miles long directed at the Earth. If, for example, the neutrino beam were pointed down at a 4.5° angle, it would cut a chord through the Earth's subsurface 1,000 km long and 20 km deep at its deepest point. Glashow says that the *in situ* acoustic pulses from a well-directed neutrino beam would be more sensitive indicators of geological structure than ground-based explosions.

The potential of high-precision oil exploration was apparently held out to the petroleum experts who attended last

week's lecture. McIntyre explained to some of them afterwards that "the industry might not have to drill a dry hole again". Heavy hydrocarbons have a much larger expansion coefficient than either water-bearing or dry rock, Glashow explained, so the signal arriving at the surface could indicate clearly whether oil lay in the underground region.

A second application Glashow described is GEMINI, for Geological Exploration with Muons Induced by Neutrino Interactions. This would involve siting ordinary mobile particle detectors where the beam emerges from the Earth. Variations of the accompanying flux of muons are said to be potential indicators of dense ore bodies along the neutrino track.

The third application would in effect be a CAT scan of the Earth's interior — potentially as exciting to geophysicists as its methods would be exotic.

Glashow and Wilson propose putting a 10 TeV accelerator out to sea. The neutrino snout would be pointed down to direct the beam through the centre of the Earth. Neutrino-counters could be located on ships at the antipode where the beam emerged.

Professor Richard Wilson of Harvard University, who is not associated with the proposal, termed it "not completely ridiculous". It's the sort of thing only the oil companies can afford", he said.

Frank Press, the geophysicist who is also president of the National Academy of Sciences, said the proposals would need lots of study and research to determine their practicality — a view Glashow shares. But they might be exciting because "there are two guys, a Nobel prize winner and the world's greatest accelerator builder, going into a new area. That's bound to be interesting."

Deborah Shapley

Polish education

War of attrition

POLISH universities and schools are being used to cripple the young ideologically and morally, General Wojciech Jaruzelski told a party meeting this week. Although, he said, the majority of intellectuals "feel bound to socialism", in some milieus of the intellectual one may still observe "obviously hostile, adventurist and destructive activity", against which "consistent" administrative measures must be maintained.

To some extent, the general's remarks may have been related to the forthcoming trials of the five scholars who acted as "advisers" to Solidarity, three of whom had previously been closely associated with the clandestine "flying university" of the late 1970s. Although the flying university in its old form has not been revived, the underground Solidarity press contains numerous allusions to "alternatives" to the state educational system, in which teachers and lecturers holding official posts may well be participating. From time to time, cases of passive resistance groups organized by academics are reported in the official media, such as the "Fighting Solidarity" group in Wroclaw, founded by the mathematician Kornel Morawiecki.

According to underground Solidarity sources, scholars who are suspected of knowing about the composition of these groups and who have refused to pass on this knowledge to the security authorities have been threatened with loss of tenure and loss of bonuses, and have found it impossible to travel to conferences abroad.

For the most part, however, university resistance remains passive. A large number of the rectors elected under the democratic procedures of 1980-81 were replaced during the "verification" process last year — a process which apparently is not yet over, since General Jaruzelski spoke of a "more thorough" phase to take place in the second quarter of this year.

The students, too, seem to have adopted a lower profile — even before Cardinal Glemp's warning to them last week that political activities could jeopardize the forthcoming papal visit. The second anniversary of the founding of the now-illegal Independent Students' Union (NZS) on 17 February apparently passed off peacefully, with only one major protest march, in Krakow, which the police managed to disperse without use of force.

Perhaps the main threat to the universities in the immediate future is not political discontent but the proposed closures next year of intake into 56 higher education courses, and the across-the-board cutback of admissions, which, according to a recent conference of university rectors and party secretaries, is necessary if the standard of education is to be improved, and university courses brought into line with the needs of the economy.

Vera Rich

"Genesis", a structurist portrait by Geoffrey I. Lilley depicting the structure of benzotriazole. Work by Lilley is on view in this year's National Society Exhibition which opened at the Mall Galleries of the Federation of British Artists on 23 February.