

NEWS AND VIEWS

Small Comfort about Particles

THERE is more relief than disappointment about the news that CERN has failed to confirm an announcement from the United States in June this year that the laws of particle physics are invariant under charge conjugation. To be sure, after the principle of parity conservation was abandoned a decade ago, nothing has seemed inviolate. Three years ago a hint that there might be something wrong with the common assumption of invariance under charge conjugation was provided by some anomalous observation of the decay of *K* mesons. Among all the troubles which beset the theoreticians, however, there is nothing to suggest that life would be simpler or more reasonable if the laws of physics dealt differently with particles and anti-particles—electrons and positrons, protons and anti-protons. This is why there was consternation in some quarters when a group from Columbia University, working with a hydrogen bubble chamber at the 30 GeV accelerator at Brookhaven, announced evidence that the principle of charge conjugation is invalid. Among a gigantic collection of photographs from the bubble chamber it had been possible to find 1,441 representing the decay of the neutral eta meson into three pi mesons, and statistical analysis suggested that the decay process was unsymmetrical with respect to the electrical charge of the particles. Briefly, the positive pi meson has a statistically greater velocity than the negatively charged pi meson. Since this was precisely the behaviour that would have been expected if the trouble about the *K* meson decay is indeed a consequence of the invalidity of charge conjugation, it is perhaps not surprising that the Columbia group tended to throw its hat a little in the air (*Phys. Rev. Letters*, **16**, 1224; 1966).

The CERN experiment has also been concerned with the decay of eta mesons, but the technique has been somewhat different from that used at Brookhaven. Instead of having to hunt for significant information in a welter of bubble chamber pictures, the CERN group has used a counter technique and has therefore been able to accumulate significant information quickly. The conclusion that there is no significant asymmetry in the decay of neutral eta mesons is based on seven times as many events as the Columbia group had to work with. Though it will obviously be some time before the matter is fully resolved, the chances are that the CERN view will eventually prevail. Meanwhile, those who may be sensitive to the charge, sometimes heard in recent years, that CERN is always second, will now be quoting the old fable about the tortoise and the hare. Those who want to see even bigger accelerators built quickly will be urging the advantages of duplication in this field. There remains the problem of the *K* meson and its anomalous decay.

Pugwash in Poland

THE sixteenth Pugwash Conference held in Sopot, Poland, last week seems to have been chiefly concerned with problems of disarmament. In this respect the sixteenth conference differs from its immediate prede-

cessor, when matters concerned with the use of science in developing countries took up a great deal of time. In Poland, four groups of people seem to have devoted themselves to problems of disarmament and the politics of disarmament. On the proposal that there should be a freeze on nuclear weapons in central Europe, the Pugwash committee emphasized the difficulty of controlling the movement of small nuclear weapons and delivery systems, and said that a treaty on non-proliferation of nuclear weapons would help to pave the way for an agreement on the freeze. The same section of the conference was in favour of a reduction of conventional troops in Europe in present circumstances. The traditional Pugwash assertion that a non-aggression pact between the NATO and Warsaw Treaty powers would be a boon was accompanied this time by a statement that some participants saw this as a step towards German reunification and that others considered that the problem of the German Democratic Republic and its legal status could be overcome by the same devices as those which enabled it to adhere to the Partial Test Ban Treaty. Another of the working groups agreed that the issue of recognition for the German Democratic Republic should not prevent the growth of collaboration between the two Germanies in economic, scientific and cultural affairs. In the same spirit the Pugwash statement urges more collaboration between European states on matters such as the exploitation of water resources, energy, transport and the like. The group seems also to have considered that educational collaboration might eventually lead to "common textbooks" in international relations, international law and other fields.

This year's Pugwash seems to have had little to say about general and complete disarmament except to recognize, perhaps more realistically than before, that this is a difficult problem. On more particular schemes for arms limitation, the conference was apparently in agreement that the nuclear test ban treaty should be extended to cover underground tests, though the statement also adds its previous view that the obstacles to a comprehensive test ban treaty are "political rather than technical". The conference suggested that a move towards a comprehensive test ban treaty might be brought about by a treaty incorporating a threshold below which nuclear explosions would be permitted, on the understanding that the threshold would be gradually lowered. To this device could be added commitments undertaken by particular states to refrain from testing nuclear weapons except under various circumstances, the provision of unmanned seismic detection stations and even on-site inspection under a "request and invitation" procedure. In this connexion the statement commends the proposal that there should be a "detection club" of countries willing to collect and to publish seismic data on the basis of which underground explosions might be identified.

Among other less carefully worked out proposals in the statement is a commendation of the non-proliferation treaty, the establishment of nuclear-free zones in places such as South America, Africa and the Middle East, and proposals to refrain from deploying anti-ballistic missile systems and the like. Pugwash commends the efforts of the International Atomic Energy Authority to control the uses made of plutonium and other fissile materials arising from civil uses of nuclear power.