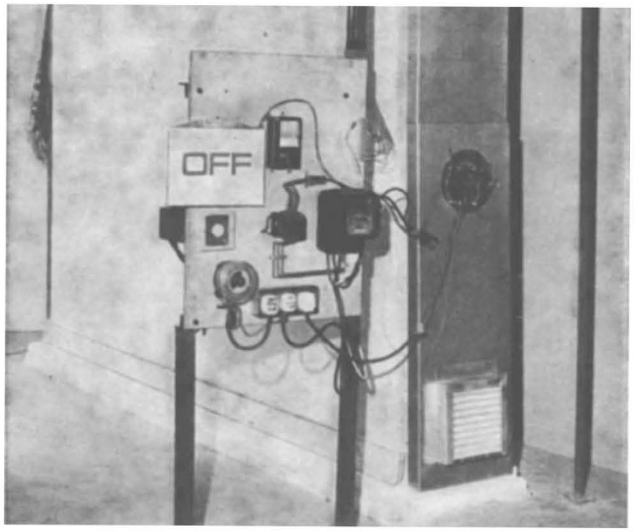

Heat by the wall.

More advanced ideas for domestic heating are also being fostered. Thus a system is being designed to capitalize on people's apparent ability to feel comfortable in a low ambient temperature provided there is plenty of radiant heat. The system requires highly reflecting walls containing aluminium with some pigment to remove the sheen, together with a series of carefully placed heaters that can be switched on when entering a room much in the way that electric lights are operated. It seems that a wall "paper" consisting of aluminium, polythene and rutile provides the best combination of high infrared reflectivity and low visual lustre. A variety of physical and psychological tests are also being carried out to gain a better understanding of what are the important ingredients of comfort.

The Electricity Council's preoccupation with ways of using off-peak electricity, now even cheaper, has also found outlets in the industrial sector. One of the more advanced projects at Capenhurst is the design of a process heater for the production of synthetic resins. This is apparently operational now, with a storage capacity of 520 kW and a charging time of eight hours.

A new way of cutting cloth using a plasma jet is also being investigated. The system uses a plasma torch in which the arc is struck between a central cathode and the interior of the nozzle, and the cutting is performed by a stream of argon which emerges from the nozzle at a very high temperature. The effects of varying several parameters such as the flame position are being studied, and it is felt that the technique could well prove valuable for materials such as linoleum, wallpaper and carpets as well as textiles. The chief advantage over oxyacetylene cutting is the lack of oxygen in the flame, so reducing the area of burning.

QUANTUM THEORY

Rocking the Boat

THE sport of trying to knock down quantum mechanics has been hanging on the periphery of physics ever since 1935 when A. Einstein, B. Podolsky and N. Rosen first put forward a paradox which led them to infer that quantum mechanics may not be a complete theory. Several theoretical physicists have latched on to the need for so-called "hidden variables" in the intervening years and a team from three universities in the United States has now suggested an experiment to settle one way or the other whether hidden variable theories are logically necessary or just a flight of fancy.

The experiment proposed by J. Clauser *et al.* (*Phys. Rev. Lett.*, **23**, 880; 1969) is an extension of an earlier experiment by Kocher and Commins on the correlation of polarizations between a pair of optical photons. In the earlier experiment, two optical photons emitted in a cascade process in calcium impinged normally on a pair of polarizers the planes of which were parallel, and the correlation of polarization was measured by standard coincidence techniques. Clauser *et al.* claim, however, that this arrangement cannot provide a proper test of a crucial inequality in the hidden variable theory. They suggest that a decisive test would be to modify the Kocher–Commins experiment to include observations at two appropriate relative orientations of the polarizers, and also with first one and then the other polarizer removed. On the assumption of using practical calcite polarizers, they have worked out what they consider the critical inequality to be verified in such an experiment, and they give a description of how this experiment should proceed.

There is some doubt as to whether it is really possible to design an experiment to substantiate a hidden variable theory which lacks any clear formulation, but it may nevertheless be possible to design an experiment which does extract the essential information to place quantum mechanics in jeopardy (or to be its salvation). Clauser *et al.* believe that their version of the two photon experiment will provide this opportunity.

REACTOR FUELS

Reprocessing Refinement

GOVERNMENT organizations and private industry in eight European countries have set up a company, Société de Fluoration de l'Uranium (SFU), to exploit a new process in the nuclear fuel cycle. SFU will convert uranyl nitrate into uranium tetrafluoride by electrolytic reduction, followed by precipitation of UF_4 with hydrofluoric acid. More established methods of producing uranium tetrafluoride, that used by the UK Atomic Energy Authority at Windscale and Springfields for example, employ a three stage process which is obviously more costly, and the countries participating in SFU are probably looking towards the market for enriched fuels which should be expanded when the advanced gas-cooled reactor comes into service.

The company, set up on the initiative of Eurochemic (the European Company for the Chemical Processing of Irradiated Fuels), will operate at the Eurochemic reprocessing plant at Mol in Belgium. Eurochemic reprocesses fuel from reactors in thirteen European countries, separating plutonium and converting the depleted uranium to uranyl nitrate, which is then fabricated into uranium fuel elements. Enrichment of the uranium is carried out by recycling uranium hexafluoride in a gaseous diffusion plant. To produce the hexafluoride, uranyl nitrate must first be converted to uranium tetrafluoride. SFU will therefore provide an important link in this chain.

The new company will have a capital of 9 million Belgian francs (£75,000), one-third being supplied by