

Physics monitor

Monopole sighting?

Earlier this year, a young Stanford University physicist saw something in the response of his superconducting magnetometer. The signal appears to correspond to what would happen if a magnetic monopole had passed through the apparatus, although more mundane (and less interesting) explanations cannot yet be ruled out.

The absence of free magnetic poles has long intrigued physicists, as the equations of electromagnetism appear to be symmetric with respect to electric and magnetic charge. Paul Dirac revived the idea of magnetic monopoles and predicted that the magnetic charge should be simply related to other physical constants.

Recently the search for free magnetic poles has been given additional impetus by the predictions of grand unified theories which attempt to bring together electroweak and strong interactions (see May 1980 issue, page 114).

Superconductors make natural magnetic charge detectors. In the Stanford experiment, a four turn 20 cm^2 horizontal loop is connected to the superconducting input coil of a SQUID (Superconducting Quantum Interference Device) magnetometer. Both the loop and the SQUID are enclosed in a magnetic shield with an ambient field of 5×10^{-8} gauss. The signal from the detector is continuously monitored and during some 150 days of operation showed no disturbances other than those caused by periodic transfers of liquid

nitrogen and liquid helium.

But on 14 February the apparatus hiccupped. A single event was recorded which is consistent with a stray magnetic monopole with Dirac charge passing through the loop.

In such a sensitive experiment, care was taken to minimize effects which could also produce such a signal. The apparatus is continuing to take data and larger detectors are also being built.

Computing the hadron spectrum

One of the basic problems in the theory of strongly interacting particles is whether the gauge theory of gluons and quarks (quantum chromodynamics — QCD) can indeed account for the observed properties of hadrons. To do this, the theory must explain both the quasi-free behaviour



Blas Cabrera in his laboratory at Stanford University where his apparatus recently gave a signal compatible with the passage of a free magnetic monopole.

(Photo Stanford University News and Publications Service)