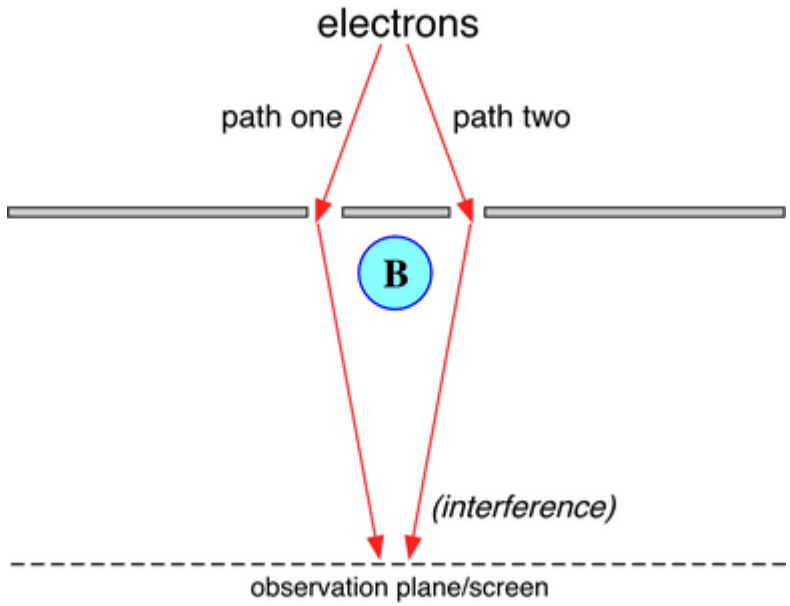
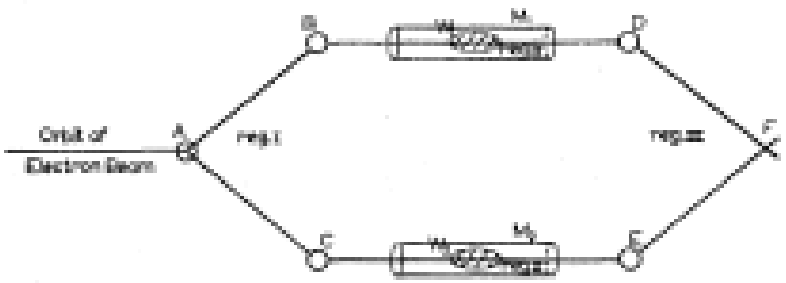
The Aharonov-Bohm Effect

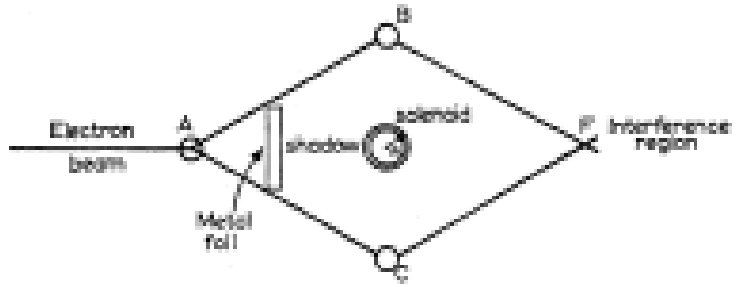


SECOND SERIES, VOL. 115, NO. 3 AUGUST 1, 1959

Significance of Electromagnetic Potentials in the Quantum Theory

Y. AHARONOV AND D. BOHM
H. H. Wills Physics Laboratory, University of Bristol, Bristol, England





VOLUME 5, NUMBER 1 PHYSICAL REVIEW LETTERS JULY 1, 1960

SHIFT OF AN ELECTRON INTERFERENCE PATTERN BY ENCLOSED MAGNETIC FLUX

R. G. Chambers
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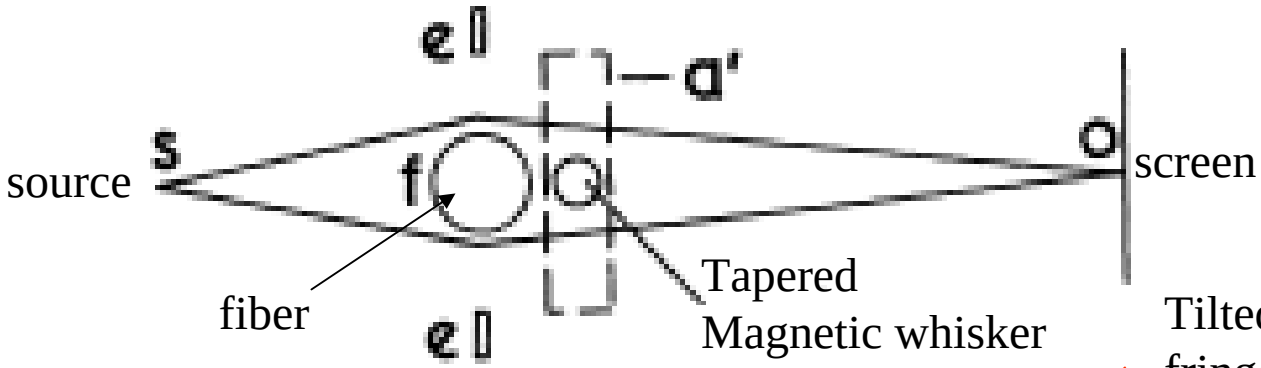


Tilted interference fringes from tapered magnetic whisker

Double slit interference fringes

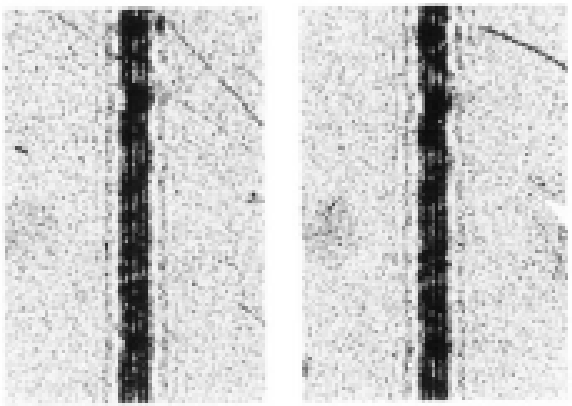


FIG. 2. (a) Fringe pattern due to biprism alone. (b) Pattern displaced by 2.5 fringe widths by field of type a'.

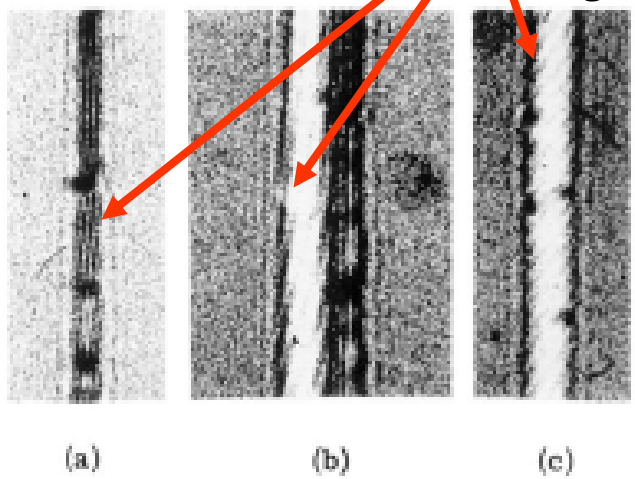


FIG. 3. (a) Tilted fringes produced by tapering whisker in shadow of biprism fiber. (b) Fresnel fringes in the shadow of the whisker itself, just outside shadow of fiber. (c) Same as (b), but from a different part of the whisker, and with fiber out of the field of view.

PHYSICAL REVIEW A VOLUME 34, NUMBER 2 AUGUST 1986

Experimental confirmation of Aharonov-Bohm effect using a toroidal magnetic field confined by a superconductor

Nobuyuki Osakabe, Tsuyoshi Matsuda, Takeshi Kawasaki, Junji Endo, and Akira Tonomura
Advanced Research Laboratory, Hitachi Ltd., Kokubunji, Tokyo 185, Japan

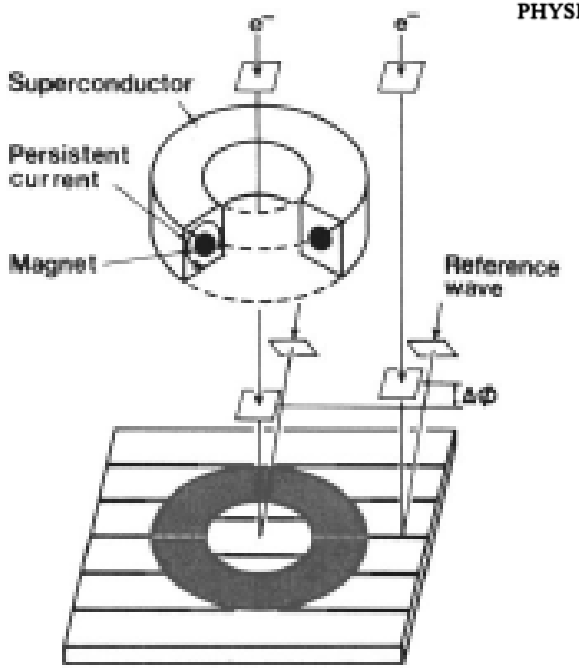
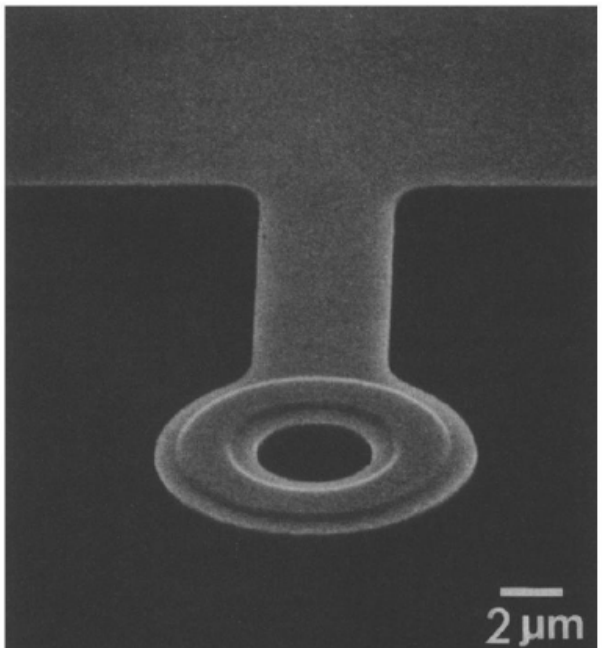
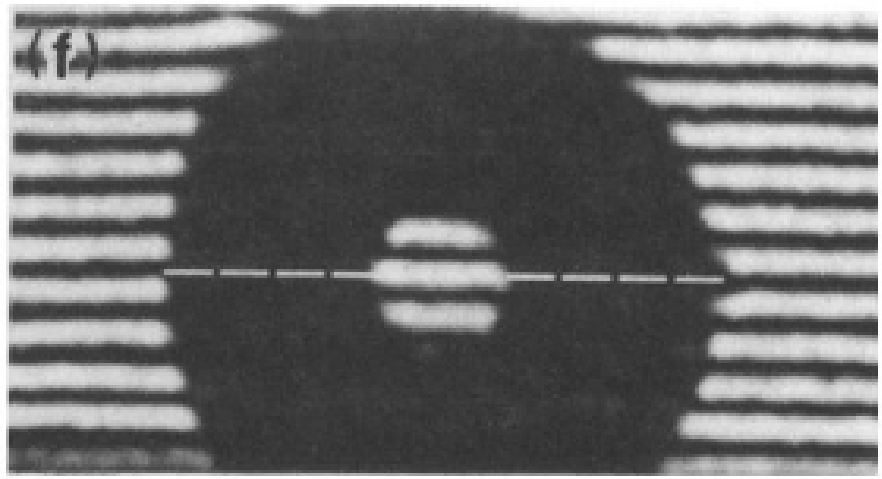


FIG. 1. Conceptual diagram of the experiment. A Cu layer for shielding from an electron wave is not shown.

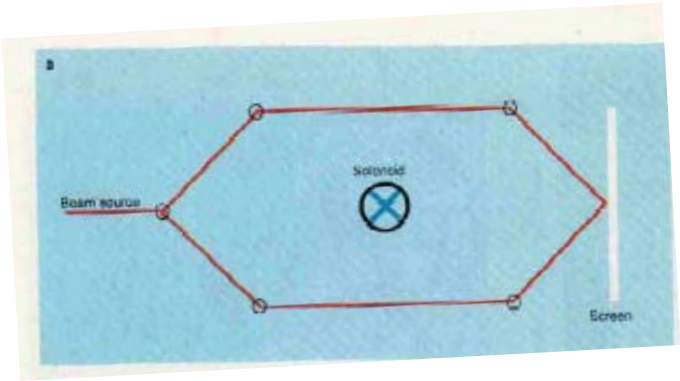


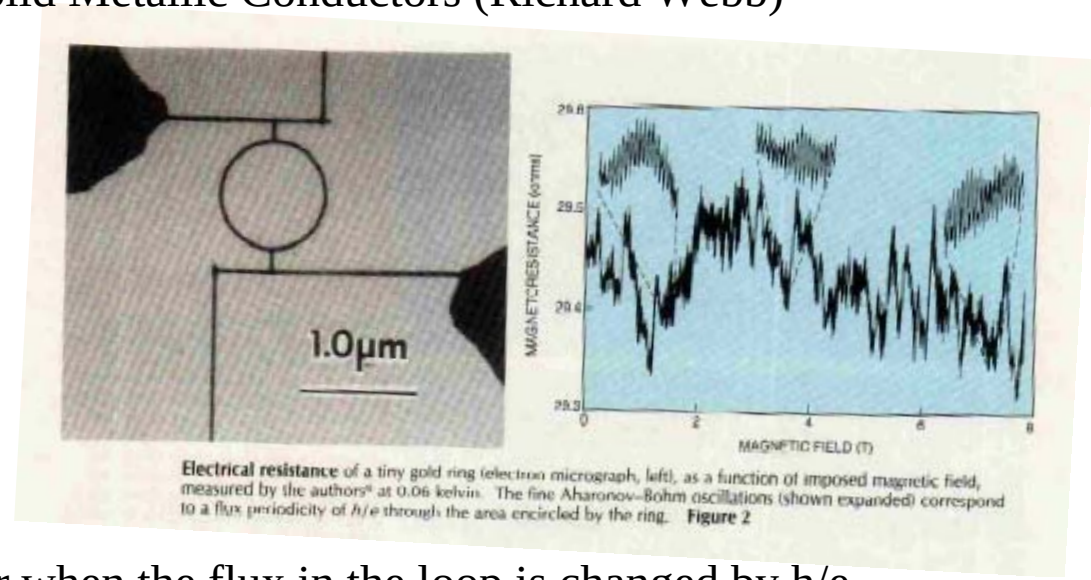


There was concern about stray magnetic fields influencing the electrons in Chamber's experiment. A new experiment was done to eliminate those stray fields by wrapping the magnet in a superconductor, seen here, which eliminates B from the interior of the toroid.

Aharonov-Bohm Effect in Solid Metallic Conductors (Richard Webb)

Magnetic Aharonov-Bohm Effect

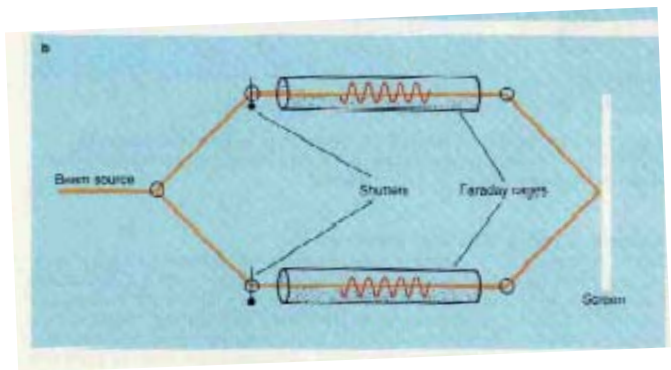


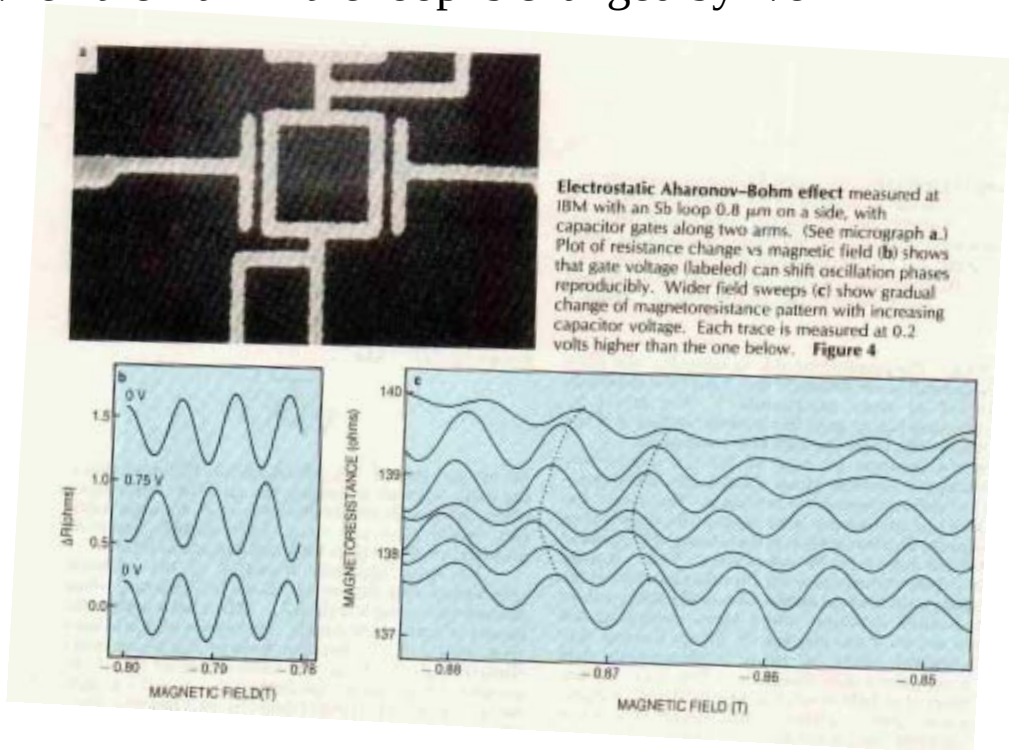


Electrical resistance of a tiny gold ring (electron micrograph, left), as a function of imposed magnetic field, measured by the authors[8] at 0.06 kelvin. The fine Aharonov–Bohm oscillations (shown expanded) correspond to a flux periodicity of h/e through the area encircled by the ring. **Figure 2**

Resistance oscillations occur when the flux in the loop is changed by h/e

Electric Aharonov-Bohm Effect





Electrostatic Aharonov–Bohm effect measured at IBM with an Sb loop 0.8 μm on a side, with capacitor gates along two arms. (See micrograph **a**.) Plot of resistance change vs magnetic field (**b**) shows that gate voltage (labeled) can shift oscillation phases reproducibly. Wider field sweeps (**c**) show gradual change of magnetoresistance pattern with increasing capacitor voltage. Each trace is measured at 0.2 volts higher than the one below. **Figure 4**

Physics Today, December, 1988