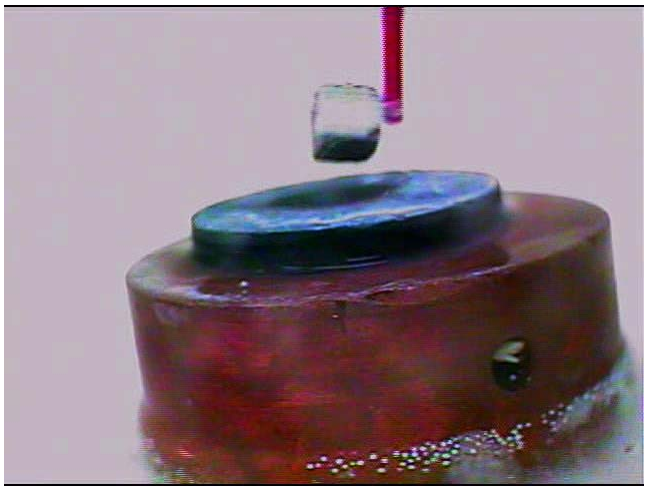
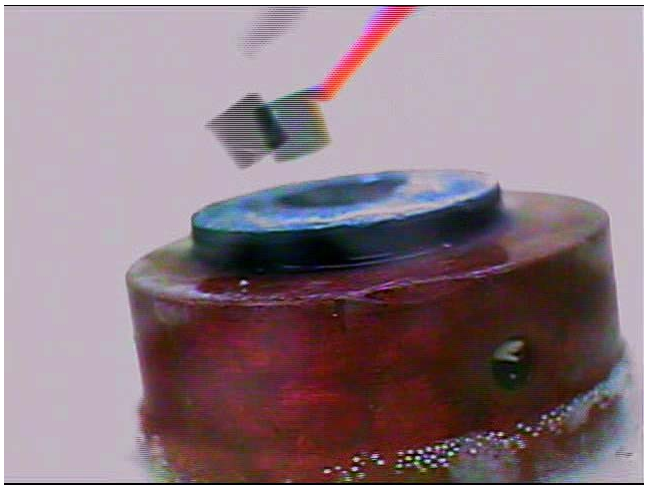
Answer #355

The wait is over! The answer is (b); the magnet will not rotate along the other axis of rotation. The magnet will instead translate side to side, and any component slightly perpendicular to this translation will cause a rotation along the same direction as before.



Alternate high-res version.

Under the hands of the overzealous operator, the magnet can be shoved so strongly that it flies completely over the edge of the superconductor and into the bubbling sea of nitrogen.



Alternate high-res version.

In the original situation, the axis of rotation was around the North-South pole of the magnet; since both the cube and the magnetic field lines have symmetry in all directions, the magnetic flux through the superconductor is unchanged as it spins merrily about, until damped by air resistance.

However in the case shown above, we are attempting to rotate the poles *themselves*! Doing so will certainly change the flux through the superconductor and would imply that the eddy currents -- already setup to oppose the magnet as it levitates at rest -- would have to continuously change as well! Said another way, our*persistent currents* are persistent not only in their magnitude (amperage) but in their direction as well. Thus the eddy currents resist the rotation of the magnet's poles and does not allow the cube to rotate freely along the other axis.

Your final question for this demonstration is to explain what determines the path of the magnet as it moves over the edge of the superconductor into the LN bath.

Question of the Week

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For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.