

STORY BY AMBER WILLIAMS

# How to ship a 17-ton superconducting magnet across the country

**P**hysicists at Fermi National Accelerator Laboratory in Illinois needed a superconducting magnet to study muons, fleeting subatomic particles. Thirty million dollars for a new experimental setup was out of the question, but they found a used one at Brookhaven National Laboratory on Long Island. If Fermi scientists could move it, they could have it. The magnet, however, couldn't be dismantled. And it had to be shipped with the utmost care because a twist of even a couple of millimeters could irreparably damage its internal wiring.

## By the Numbers

**Width:** 50 feet  
**Weight:** 17 tons  
**Distance:** 3,200 miles  
**Cost to move:** \$3 million



## TRAVEL ADVISORIES

The magnet wouldn't fit through tollbooths, so an all-highway route wouldn't work. And if it fell from a helicopter through power lines, it could cause a blackout. Waterways were the only option. The journey began in June: few hurricanes, no frozen rivers.

START



The magnet sat in Building 919 at Brookhaven National Laboratory on Long Island.

The moving team built a steel structure around the magnet to help it remain flat during the trip.

At midnight on June 24, the truck drove along the William Floyd Parkway as a police escort set up a rolling road closure, shutting down ~500–1,000 feet at a time.

With rollers, rigging, and jacks, they maneuvered it onto a specially adapted 64-wheel flatbed truck.

In its casing, the magnet now weighed 53 tons.

Several trees along local roads were removed to accommodate the behemoth ahead of time. The magnet took up all four parkway lanes.



15 MPH  
Top speed

The truck arrived at a Long Island marina two hours later, where an extra-large crane transferred the magnet to a barge.

For the next three and a half weeks, it traveled down the East Coast, around Florida, and through the Gulf of Mexico.

The barge traveled up the Mississippi, Illinois, and Des Plaines rivers. It didn't encounter problems going through lock systems and had to stop only once because of fog in Tennessee.

Because of high waves, the barge harbored in Chesapeake Bay for 5 days.

Tugboats *Trident* and *Miss Katie* guided the barge, and accelerometers mounted on the magnet warned the team in real time if it was rocking too much.

Lifted back onto its truck, the magnet traveled over Illinois highways for three nights.

~2 ft.  
Clearance per side on a I-355 toll collection area

FINISH

**JULY 26 / ARRIVAL AT FERMI / 4:07 a.m.**

Now the magnet sits in a staging area about a mile from where it will ultimately reside in a new building currently under construction. Over the next few months, physicists will inspect the magnet for damage, although they won't know whether it will work until it's hooked up to the rest of the equipment.