

Obituary: Gordon T. Danby

Gordon T. Danby, a far-seeing physicist who retired from BNL's Accelerator Department on December 31, 1999, after 42 years at the Lab, died on August 2, 2016. He was 86 years old.

Gordon Danby and his fellow BNL scientist James Powell were the inventors of superconducting magnetically levitated trains, a concept known as Maglev. Since 1990, BNL has run an Annual Middle School Magnetic Levitation (Maglev) Contest, like this one reported in the Brookhaven Bulletin in 2009:

April 24, 2009

Center Moriches Students Take Top Honors at BNL's Maglev Contest

Center Moriches Middle School students were the champions of the annual Maglev Contest held on April 1 at BNL, earning six out of a total of 21 prizes. Longwood Junior High students were the second-place winners with three prizes.

BNL scientists Gordon Danby and James Powell, now retired, invented Maglev — the suspension, guidance and propulsion of vehicles by magnetic forces — and patented it in 1986. As honored guests at the contest, Danby and Powell were happy to be in the midst of the students' enthusiasm.

"I envy you because you are at the beginning of this transport system," Powell said. "Our goal is to have a transcontinental railroad in May 2019. Twenty years from now, you'll even be able to travel in space

for just a few thousand dollars, since Maglev allows people and things to be launched cheaply into space."

One hundred eighty students from 12 Long Island middle schools entered the contest, in which they were required to design and construct model Maglev vehicles according to engineering specifications within their choice of six categories: electrified track, wind power, gravity, self-propelled, futuristic, and scale-model design. Judging was based on speed, efficiency, the appearance of the vehicles, and the students' written design process.

Albert G. Prodell Middle School, East Northport Middle School, Northport Middle School, Great Neck South Middle School and Mineola Middle



Roger Shutenbough D146009

Center Moriches students captured all three places in the "Self-Propelled, Balloon" category. Standing are: (from left) Maria Dikeakos, DOE On-Site Office, Nick Tyson (3rd place), Ariana Monaco (1st place), Annie Munroig (2nd place), and Bernadette Uzzi, BNL, the contest coordinator. Seated are Maglev inventors James Powell and Gordon Danby, retired BNL scientists.

School each won two prizes. Alfred G. Berner Middle School and Robert Moses Middle

School each won one prize. All winning students received trophies. — Satya Shanmugham

Gordon Danby's life and research accomplishments, including Maglev, are explored in the following three articles:

The New York Times obituary, August 14, 2016:

SCIENCE

Gordon T. Danby, Who Helped Invent Magnetic-Levitation Trains, Dies at 86

By HENRY FOUNTAIN AUG. 11, 2016

Gordon T. Danby, a physicist who with a colleague invented superconducting magnetic-levitation trains in the 1960s and then spent decades in largely futile efforts to get them built, died on Aug. 2 in Stony Brook, N.Y. He was 86.

His daughter, Jennifer, confirmed his death. Dr. Danby, a longtime resident of Wading River, N.Y., moved to an assisted-living facility in nearby East Setauket three years ago.

Dr. Danby was a young scientist at Brookhaven National Laboratory on Long Island in 1960 when a colleague and housemate, James R. Powell, told him about an idea he had had one day while stuck in traffic for five hours. The idea was for a futuristic train without tracks or an engine, but with strong electromagnets that would keep the cars elevated and propel them, providing a very high-speed and nearly friction-free ride.

The concept of using magnetic forces in what is known as a maglev train had been around for half a century. But Dr. Danby and Dr. Powell proposed using superconducting magnets that would be powerful enough to levitate heavy passenger or freight train cars.

The two were familiar with this kind of magnet; Dr. Danby, for one, had helped design some for a Brookhaven research instrument called the Alternating Gradient Synchrotron, which for most of the 1960s was the most powerful particle accelerator in the world.

The two men worked on the maglev project in their spare time, published a paper on it in an engineering journal in 1966 and received a patent two years later.

“If we had not been working on it together, I doubt it would ever have happened,” Dr. Powell said.

Scientists and engineers from the federal government and from Germany and Japan soon came calling, he recalled.

For their work on maglev transportation, Dr. Danby and Dr. Powell were awarded the Benjamin Franklin Medal in Engineering in 2000 by the Franklin Institute in Philadelphia.

But despite the pair’s extensive efforts at promotion — speaking at conferences, testifying at hearings and collaborating on books with titles like “The Fight for Maglev” — the concept has never caught on widely.

Early federal funding to develop the technology dried up, and although the idea occasionally resurfaces in the United States — there is talk of trying to bring the technology to the Northeast rail corridor — superconducting maglev train have been built only in Japan, as demonstration tracks. There are also a few maglev trains that use conventional electromagnets, including one in Shanghai.

Gordon Thompson Danby was born on Nov. 8, 1929, in Richmond, Ontario, near Ottawa. After developing rickets as a child, he was sent to live with his grandparents at their farm in rural Ontario. He became a skilled hockey player and played the sport semiprofessionally.

He studied mathematics and physics at Carleton University in Ottawa and received a doctorate in nuclear physics in 1956 from McGill University in Montreal. Dr. Danby was hired at Brookhaven the next year and worked there until 1999.

While at the lab, he devised a way to make particle accelerators more powerful by using separate magnets to bend and curve the particle beam, rather than combining the functions in one magnet. He later worked as a consultant for the Fonar Corporation in Melville, N.Y., designing superconducting electromagnets for the company's magnetic resonance imaging machines, including those that allow a patient to be upright during the procedure.

In addition to his daughter, Dr. Danby is survived by his wife, Jane, and a son, Judd.

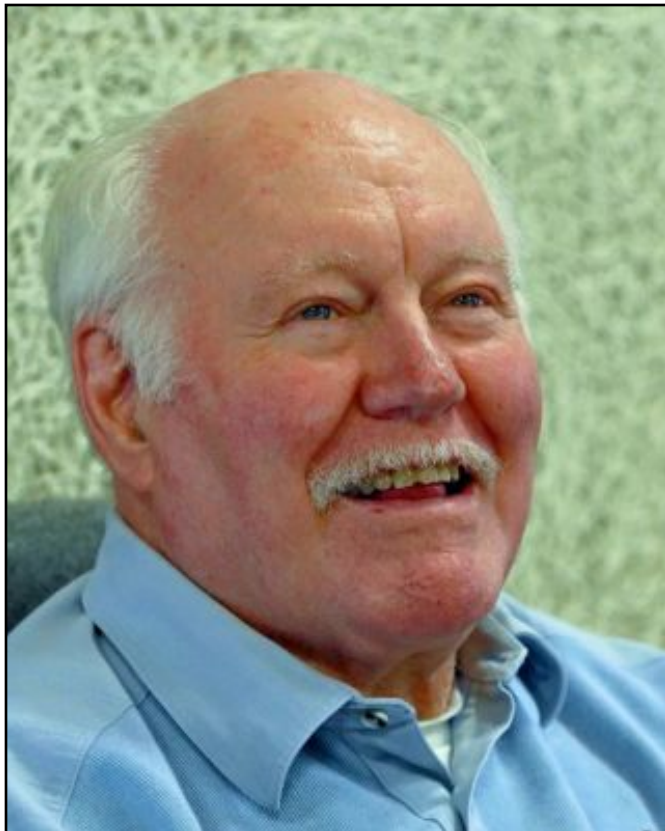
In the 1990s, frustrated by the lackluster response of federal agencies to their maglev work, Dr. Danby and Dr. Powell proposed a privately financed 20-mile line in Florida. It did not get very far. But they never stopped believing in the technology and promoting it.

Dr. Danby even once took a trip to Japan to see their maglev train in action. "It was very nice," he told The New York Times. "It went by with a whoosh."

Newsday obituary August 18, 2016:

**Gordon Danby dead at 86;
helped invent magnetic levitation train**

By Paul LaRocco paul.larocco@newsday.com



Gordon Danby, a longtime Brookhaven National Laboratory physicist who invented superconducting magnetic levitation trains and made advancements in MRI technology, died Aug. 2, 2016. He was 86. Photo Credit: Danby family

HIGHLIGHTS

Was longtime scientist at Brookhaven National Lab
Physicist integral in advancement of MRI technology

As a physicist who specialized in magnet technology, Gordon Danby helped invent the first superconducting magnetic levitation train and was integral in some of the most significant MRI advancements.

It wasn't just his formidable intelligence that led to the breakthroughs, said James Powell, Danby's longtime friend and colleague who teamed with him to develop the superconducting "maglev" train.

"He had what I call 'wonder-lust,' " Powell said. "Not wanderlust. He wondered about things: how to do it better, and was always striving for that."

Danby, a longtime Wading River resident who worked at nearby Brookhaven National Laboratory, died Aug. 2 at Stony Brook University Hospital. He was 86, and had lived in recent years at an East Setauket assisted living center.

Born in Canada, Danby was raised on his grandparents' farm after developing rickets as a young child. He got his bachelor's degree in physics and math from Carleton University in Ottawa and a nuclear physics doctorate from Montreal's McGill University.

With his skills in demand after World War II, Danby took a job at Brookhaven Lab in 1957. He met his wife, Jane,

on Long Island, raising two children, Jennifer and Judd, in a historic Wading River home.

“He was for experiences that would give you pride and humility,” said Jennifer Danby, 52, of Long Beach, citing her father’s early health issues as forming his perspective. “He was never — and I’m not just making a romantic memory — programmed to the negative.”

At Brookhaven, Danby aided design and construction of the Alternating Gradient Synchrotron, or AGS, which was, upon its debut in 1960, the world’s largest particle accelerator.

But he was most known for the superconducting maglev train, which he and Powell invented in the early 1960s after Powell had the idea one day while stuck in terrible traffic.

“It couldn’t have been done without him,” said Powell, who also worked at Brookhaven Lab in Upton. “He was the real expert in superconductors.”

Danby and Powell for years would spend their free time working on the concept, writing dozens of research papers and attending countless conferences to promote what they saw as a safe, high-speed way to transform modern commercial transportation. In the 1980s, then-Sen. Daniel Patrick Moynihan (D-New York) led a task force on superconducting maglev trains, but federal funding was never sufficient to lead to successful development in the United States.

Still, a working prototype was completed in Japan, and Danby and Powell pursued privately funded efforts to build a test track for the train in Florida. The two men received the Franklin Institute medal in 2000 for their scientific work.

Danby retired from Brookhaven in 1999. His later work with Melville-based Fonar Corp. helped lead to stand-up, open MRI machines.

"He was, in my estimate, the world leader in MRI design," said Powell, 84, of Ridge.

Jennifer Danby said her father, who also sat on the Wading River school board, always separated his work in science and the accompanying funding frustrations with family life.

"He never brought his stress home; there was never negativity," she said. "I saw him never give up, but I also saw him not make himself crazy when he couldn't control something."

Gordon Danby is also survived by his wife and his son, Judd, of Lafayette, Indiana. Memorial and cremation services were held earlier this week.

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Brookhaven Bulletin, April 28, 2000:

BROOKHAVEN BULLETIN

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April 28, 2000

BROOKHAVEN NATIONAL LABORATORY

Danby, Powell Win Benjamin Franklin Medal For Their Invention of Magnetically Levitated Trains

James Powell and Gordon Danby, both retired researchers from BNL, have been awarded the 2000 Benjamin Franklin Medal in Engineering by The Franklin Institute "for their invention of a novel repulsive magnetically-levitated train system using superconducting magnets and subsequent work in the field."

One of five Franklin medals awarded annually, the engineering medal was presented to Powell and Danby yesterday, April 27, at an awards ceremony in the rotunda of the Benjamin Franklin National Memorial in The Franklin Institute of Philadelphia. The Franklin medal winners were also involved in a series of lectures, symposia and informal discussions planned for this week.

In 1961, when he was delayed during rush hour on the Throgs Neck Bridge, Powell thought of using magnetically levitated transportation (Maglev) to solve the traffic problem. Powell and his friend Danby, in their spare time, jointly worked out a Maglev concept using static magnets, which are typically superconducting, mounted on a moving vehicle to induce electrodynamic lifting and stabilizing forces in specially shaped loops on a guideway. They obtained a patent on the technology in 1968.

In 1987, U.S. Senator Daniel Patrick Moynihan from New York chaired the U.S. Senate's Energy and Public Works Committee's Maglev Task Force, on which Powell and Danby served as co-chairmen. This initiative brought about renewed interest and new funding from the federal government and some state governments for Maglev research.

Today, Powell and Danby are part of a consortium called "Maglev 2000,"



James Powell



Gordon Danby

which plans to complete a half-mile Maglev test track in Titusville, Florida, by 2002. Eventually, the consortium plans to build a 20-mile Maglev track between the Kennedy Space Center and the Titusville Regional Airport. In a separate Maglev project in Japan, plans are under way to build a 300-mile track from Tokyo to Osaka.

Powell first came to the Lab in the summer of 1952 to work as a research assistant, while he was an undergraduate student at the Carnegie Institute

of Technology. He received a B.S. in chemical engineering in 1953, and a Sc.D. in nuclear engineering from the Massachusetts Institute of Technology in 1958. He officially began his 40-year career at BNL in 1956 as an assistant nuclear engineer, and he was eventually promoted to head of the Laboratory's Reactor Systems Division.

Powell's work was innovative and wide-ranging. He made contributions in such areas as advanced nuclear reactors, nuclear waste transmutation, ball lightning, fusion reactors, superconductivity, and space and defense systems. Powell retired from Brookhaven in 1996.

A native of Canada, Danby received a B.S. in physics and math from Carleton University in 1952, and a Ph.D. in nuclear physics from McGill University in 1956. He joined BNL in 1957 as an assistant physicist, assisting in the final design and construction of the Alternating Gradient Synchrotron. Danby was promoted to senior physicist in 1980, and, in 1992,

his outstanding contributions to accelerator physics and magnet technology were acknowledged by Brookhaven Lab's giving him its Distinguished Research & Development Award. Danby retired from BNL in 1999.

In work unrelated to his mission at the Lab, Danby's research in magnetic technology led to the open magnetic resonance imaging (MRI) machines. A Fellow of the American Physical Society, Danby was also honored with the New York Academy of Sciences Boris Pregel Award for Applied Science and Technology, in 1983.

Founded in 1894, The Franklin Institute awards medals annually in recognition of the recipients' genius and civic spirit and in memory of the Institute's namesake, Benjamin Franklin, who exhibited those same qualities. Some noted past recipients of the Franklin Institute medals include Thomas Edison, Albert Einstein and Stephen Hawking. In the twentieth century, 91 Franklin Institute laureates have also been honored with 93 Nobel Prizes.

— Diane Greenberg