Members in the Media

"Our opinion is that fractal analysis doesn't give you the right to have an opinion."

***Harsh Mathur**, Case Western Reserve University, claiming misuse of fractal analysis to judge the authenticity of a Jackson Pollock painting, Cleveland Plain Dealer, December 25, 2006*

"I welcome open, intelligent discussions on fractal analysis. My scientific reputation does not hinge on this controversy, but rests on the more than 200 publications I have authored in the past 20 years."

***Richard Taylor**, University of Oregon, on other people's criticism of his work on fractal analysis of Pollock paintings, Cleveland Plain Dealer, December 25, 2006*

"We feel that we've really only scratched the surface and the comet has already given us some surprises and mysteries. So it's going to keep us busy for a long time."

***Andrew Westphal**, University of California, Berkeley, on analyzing dust grains collected from a comet with NASA's Stardust mission. Contra Costa Times, December 15, 2006*

"I couldn't figure out why. It drove me nuts. But when I began to study it, it turned out to be all basic physics."

***Diandra Leslie-Pelecky**, University of Nebraska-Lincoln, on seeing a race car crash into a wall, which inspired her to write a book on the physics of NASCAR, Christian Science Monitor, January 2, 2007*

"Supersymmetry is a vital part of string theory, so if the LHC doesn't find it, that would argue strongly against string theory. If it is observed, you can say that string theory has not been disproved, but not that it has been validated."

***Lawrence Krauss**, Case Western Reserve University, Wall Street Journal, January 5, 2007*

"I thought he was trying to do what he could to keep a declining operation functioning as well as he could."

***Gerald E. Marsh**, on Linton Brooks' dismissal as head of the National Nuclear Security Administration, The New York Times, January 5, 2007*

"I like to think of visible matter as the olive in the martini of dark matter."

***Sean Carroll**, Caltech, Los Angeles Times, January 8, 2007*

"It was as if his internal organs received a severe sunburn and peeled."

***Peter D. Zimmerman**, King's College, London, on the poisoning of Russian spy Alexander Litvinenko with polonium-210, Los Angeles Times, January 1, 2007*

"Nobody has built an instrument this sensitive. It is a probe into the unknown."

***Ramanath Cowsik**, Washington University, on an experiment to measure gravity more precisely, St. Louis Post-Dispatch, January 8, 2007*

"It's one thing to have all the components working and another to have them all working together. To me, that's the key technical issue that has yet to be resolved."

***Raymond Jeanloz**, University of California, Berkeley, on untested replacement nuclear warheads, The New York Times, January 7, 2007*

Engineering Academy Seeks Grand Challenges

In September, the National Academy of Engineering will announce 20 Grand Challenges in Engineering for the 21st century. The challenges will be identified by a distinguished panel, chaired by former Defense Secretary William Perry. Says NAE President William Wulf, "we hope that the outcomes of this project will provide a guide toward the future for engineers, a tangible motivation for young people who want to make a difference, and a better public understanding about how engineering shapes our world."

The Academy and the committee are asking for community input, which can be given at the Grand Challenge web site, www.engineeringchallenges.org. According to Wulf, those nominating grand challenges should consider particularly the areas of their expertise, and include pertinent back-up materials.

Among the other committee members are former NIH Director Bernadine Healy, "Applied Minds" Chairman and former Disney Imagineer Danny Hillis, Google co-founder Larry Page, APS Fellow and Princeton professor Robert Socolow, and human genome sequencer J. Craig Venter.

This Month in Physics History

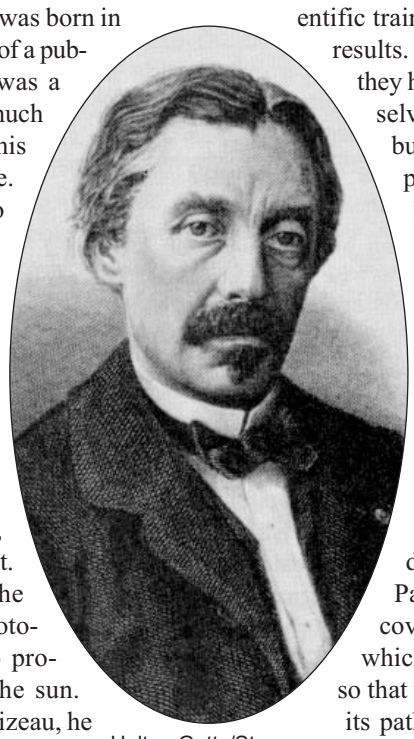
February 3, 1851: Léon Foucault demonstrates that Earth rotates

By the mid 19th century, most educated people knew that Earth spins on its axis, completing a rotation once a day, but there was no obvious visual demonstration of the Earth's rotation, only astronomical evidence.

As early as Galileo's time, scientists had tried to demonstrate Earth's rotation by dropping objects and measuring how far eastward they landed, but these efforts were too crude and inaccurate to be conclusive.

Not until Léon Foucault's famous pendulum demonstration in 1851 was there clear dynamical proof of Earth's rotation.

Jean Bernard Léon Foucault was born in Paris in September 1819, the son of a publisher. In his school days, he was a rather timid boy and never had much success academically. Much of his education was obtained at home. His mother wanted him to become a doctor, so he enrolled in medical school, but he quickly found he couldn't stand the sight of blood and dropped out.



Hulton Getty/Stone

Foucault lacked formal scientific training, but he had great dexterity, a talent for building mechanical gadgets, and a great intuitive understanding of nature. After leaving medical school, Foucault worked as a lab assistant. He then took an interest in the recently invented Daguerre photographic process and used it to produce the first photograph of the sun. With his collaborator Armand Fizeau, he devised a way to measure the speed of light using rotating mirrors, and in 1850, he showed that light travels more slowly in water than in air.

One night in early January 1851, at about 2 a.m. according to his journals, Foucault had an insight. He realized that if he could devise a way to hang a pendulum from the ceiling in such a way that the pendulum was free to swing in any direction, he would be able to see the effect of Earth's rotation. It would appear that the pendulum's path was slowly shifting, while in fact the pendulum's plane of oscillation would stay fixed while Earth turned beneath it.

He realized the pendulum had to be designed very carefully. The bob must be perfectly symmetrical. When starting the pendulum swinging, it had to be released gently, as the slightest push would ruin the demonstration. But if done properly, it would be the first clear and dramatic demonstration of the Earth's rotation.

After successfully completing the experiment in his basement, he was ready to try it on a larger scale. On February 2, 1851, Foucault sent a notice to scientists in Paris, saying "You are invited to see the Earth turn."

The next day, in the Meridian Room of the Paris Observatory, the assembled scientists did indeed witness the Earth turn. The first pendulum demonstration was a success.

Foucault had also derived a simple equation, known as his sine law, which gives the time it would take for a pendulum at any given latitude to complete a rotation. At the equator, the pendulum's plane of oscillation would never move, while at the North Pole the plane of the pendulum would complete a 360 degree rotation in 24 hours. In Paris, the pendulum would turn 270 degrees in a day.

Although this first demonstration was a success, the elitist scientific establishment, which had never accepted Foucault because of his lack of scientific training, was slow to appreciate his results. Possibly they were annoyed that they had not made the discovery themselves. Some tried to claim priority, but Foucault was indeed the first to propose the simple sine law. In fact, some scientists at the time had predicted that the effect Foucault had so clearly demonstrated would not occur at all, or would be too small to observe.

Foucault repeated the demonstration for the public in March in the Pantheon, an ideal building for such an impressive demonstration because of its high dome. Foucault had the Pantheon's elegant marble floor covered with a wood platform, on which he spread a thin layer of sand, so that the pendulum pointer traced out its path in the sand, making the slow rotation clear. The pendulum itself was a 28 kg brass bob, 38 cm in diameter, hanging on a 67 meter long wire.

The public was enthralled by the striking demonstration. Ordinary Parisians flocked to see the exhibit. Foucault became a celebrity, and soon many more such pendulums appeared in cities around the world.

Foucault continued his scientific work. Within a year of first demonstrating his pendulum, Foucault went on to invent the gyroscope as another way to show Earth's rotation. For another exhibition of the pendulum in Paris in 1855, Foucault invented a device that would give the bob an electromagnetic kick to keep it from slowing down and eventually coming to a stop.

Napoleon III, who was himself an amateur scientist and supportive of Foucault, arranged for him to hold the position of Physicist Attached to the Imperial Observatory, where he made significant improvements to the telescopes. Still the French Academy of Science was reluctant to elect him to membership. Eventually, after petitioning several times, Foucault was finally elected in 1865. He died in Paris on February 11, 1868, at age 49.

The public continues to be fascinated with Foucault pendulums, which can be found in science museums and other public spaces around the world.

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