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# What is a Foucault's Pendulum, hanging in the new Parliament building

The pendulum hangs from a skylight at the top of the Constitution Hall. Here is how it was originally designed.

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Religious leaders watch the pendulum in the new Parliament building, inaugurated on May 28. (Photo courtesy: National Council of Science Museum)

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Suspended from the ceiling of the Central Foyer of India's new Parliament building, inaugurated on Sunday (May 29), is a Foucault pendulum that all but touches the floor as it rotates on its axis. The pendulum hangs from a skylight at the top of the Constitution Hall, and signifies the **“integration of the idea of India with the idea of the cosmos”**.

Created by the National Council of Science Museum (NCSM) in Kolkata, the pendulum is being dubbed as the largest such piece in India, 22 metre in height, and weighing a staggering 36 kg.

Speaking to *The Indian Express*, Arijit Dutta Choudhury, Director General of NCSM, said, “It is a matter of pride for all the members of NCSM that we could contribute in a small way to the development of the new parliament building.”

On the ground, a circular installation has been created to allow the pendulum's movement, with a short grill around it, allowing the visitors to stand around. **At the**

latitude of the Parliament, it takes 49 hours, 59 minutes, and 18 seconds for the pendulum to complete one rotation, as per the details displayed at the installation.



(Courtesy: National Council of Science Museum)

“This Foucault’s Pendulum is not something new ... the first one was installed in 1991 at the Inter-University Centre for Astronomy and Astrophysics (IUCAA) in Pune. When we first installed it there, we faced some fittings problems which had to be rectified ... The Foucault’s pendulum at the new parliament building has a new design ... We have been testing it for quite some time ... To avoid any untoward incident, we even developed a prototype, and installed and tested it at Science City, Kolkata,” Choudhury added.

### What is a Foucault’s pendulum?

The original Foucault’s pendulum, named after 19th century French scientist Leon Foucault, is a simple experiment to demonstrate the earth’s rotation. When

Foucault carried out this experiment for the public in 1851, it was the first direct visual evidence of the fact that the earth rotates on its axis.

The experimental set-up involves a heavy object hung from a height with a string, free to swing in any direction. Once set in to-and-fro motion, the pendulum is seen to change its orientation slowly over time. For example, if the initial motion imparted to it was in the north-south direction, after a few hours it could be seen moving in the east-west direction.

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Actually, it is not the pendulum that changes its plane of motion, but the ground beneath it. Observers standing on the ground do not notice the earth's rotation, because they too are rotating with the earth, but can notice the change in orientation of the pendulum.

At the north and south poles, when the pendulum is aligned with the axis of rotation of the earth, the pendulum's back-and-forth motion comes back to its original plane in exactly 24 hours. That is, if it starts swinging in the north-south direction, it then slowly turns in the northeast-southwest direction, then in the east-west direction. It keeps on changing its orientation, till it is back in its original orientation after 24 hours.

At other latitudes, it takes longer for the pendulum to return to its original orientation of swinging. That is because the pendulum is not aligned with the axis

of rotation of the earth. **At the equator, the pendulum is perpendicular to the axis of rotation, and hence it never changes its orientation of the swing.** Meaning, a Foucault's pendulum at the equator would not show any deviation from its original course. At other latitudes it will, and would return to the original course after fixed time periods.

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Foucault's pendulum is a standard fixture in many science museums across the world, meant to be an educational tool for children to learn about the rotation of the earth. Till quite recently, the Earth's spherical shape, and its rotation on the axis, were not intuitively accepted by most people. That is why experiments like Foucault's pendulum also represent the spirit of scientific inquiry and scientific temper.

## How was the pendulum made for the Parliament?

Tapas Moharana, Project Incharge, tells *The Indian Express* that all the components of the pendulum have been completely made in India, and creating the entire piece took them around 10-12 months. The team comprised Moharana, NCSM's Curator-D, along with fellow Curator-D Shatadal Ghosh, and their team. The Central Research & Training Laboratory (CRTL) is the R&D unit of NCSM, which in turn, functions under the aegis of the Ministry of Culture.

Moharana says they had received a call from the Central Public Works Department (CPWD) last year, asking how this could be done. **The piece, made using gunmetal, has been fixed with an electromagnetic coil to ensure hassle-free movement,** Moharana explains.

**"The suspension system is mounted on the ceiling. There is continuous power supply so there are no obstacles (to the pendulum's movement).** The first such

pendulum was installed in Pune. We made some alterations here,” Moharana said.

Speaking on the challenges, he said, “Perfectly balancing and installing it at such a height and sustaining it was a challenge. Anyhow that has been mitigated.”

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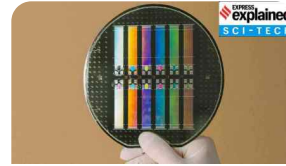
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On the symbolism of the pendulum and its prime place in the hallowed building, Moharana told The Indian Express that **Article 51A of the Constitution enshrines every citizen “to develop the scientific temper, humanism, and the spirit of inquiry and reform”**. In keeping with that, there was a decision by those handling the **project to have a piece reflecting this**, he adds.

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