

# BLACK HOLES DON'T MOVE AROUND SUCKING IN OBJECTS LIKE A VACUUM CLEANER: DIRECTOR, IUCAA

Relevant for: Geography | Topic: The Earth and the Solar System

**Mumbai, 27 October 2020**

“Unlike being portrayed in many science-fiction movies, Black Holes don't move around sucking in objects like a vacuum cleaner. If the Sun turns into a black hole today, it won't suck the other planets; the earth will still be revolving around the sun as if nothing happened, except that there won't be any light and that the earth will turn very cold...but still we will be revolving.”

Director, Inter University Centre for Astronomy and Astrophysics, Pune, Somak Raychaudhury began his Nehru Science Centre, Mumbai lecture by busting some myths about Black Holes. NSC Mumbai, Ministry of Culture's online lecture on 'The Nobel Prize 2020: Physics' – Unravelling the Mythical Black Holes by Somak Chaudhury, focussed on how the contribution of different scientists over different periods of time, right from Isaac Newton till date, have resulted in a better understanding of the black holes.

This year, three scientists have won the 2020 Nobel Prize in Physics for their contribution in understanding Black Holes: **Roger Penrose** (for the discovery that black hole formation is a robust prediction of the general theory of relativity), **Andrea Ghez** and **Reinhard Genzel** (for the discovery of a supermassive black hole at the centre of our galaxy).

While talking about the relevance of the lecture being organised, Shri Chawdhury also pointed out the 'Calcutta connection' of Nobel Prize for Black Holes. He mentioned that in their study about black holes, both Stephen Hawking and Roger Penrose used the formalism laid down in 1955 by Amalkumar Raychaudhuri, a famous professor of physics at Ashutosh College under the University of Calcutta. His paper 'Relativistic Cosmology Paper 1' is about Einstein's theory of general relativity.

“The paper says nothing about black holes, instead it is a concept of 'differential geometry'. Hawking used this concept to define how a spinning star with angular momentum collapses and distorts the space time to finally end up in a singularity, and showed how singularity is quite natural and that it is not an unusual happening in the universe. This was explained by both Hawkins and Penrose in their paper, which was cited by Nobel committee this year.” said Chaudhury.

A black hole has two basic parts: the singularity and the event horizon. The singularity is at the centre and is where the mass resides. It was Stephen Hawking and R. Penrose who wrote the first paper on Singularities”, he added.

Black holes are of three types, classified on the basis of their mass - Stellar mass black holes, Mid- size black holes and Super Massive black holes.

“Findings of Andrea Ghez and Reinhard Genzel have shown the super massive black hole in the middle of our galaxy. One cannot see the black hole since no light comes from it. Hence the scientists thought of watching the stars very close to the black holes and observe their movement and believed that from their mass, the mass of the galaxy and the black holes can be

measured. They have been observing the movement of stars in the galaxy since 30 years”, he added. Shri Chaudhury also said that how technologies like adaptive optics helped in getting a clear image of the black holes, even when it is tough to obtain one, due to dust.

He also mentioned about Laser Interferometer Gravitational Wave Observatory - India and the role of India in the findings and research of black holes. “India is part of the biggest research in the world that is working in the field of black holes. The construction of the LIGO is coming up in Hingoli district, Maharashtra. Land has been acquired for this purpose and work has already started”, he added.

Shri Somak Raychaudhury proudly claimed that all three of the eminent personalities who had contributed to the black holes were his teachers. “I learnt my General Relativity from Amalkumar Raychaudhuri, I took mathematics course at Oxford University from Penrose and studied about black holes from Stephen Hawking.”

**Laser Interferometer Gravitational Wave Observatory - India** is a planned advanced gravitational-wave observatory to be located in India as part of the worldwide network. The LIGO-India project will be built by the Department of Atomic Energy and the Department of Science and Technology, Government of India, with a Memorandum of Understanding with the National Science Foundation (NSF), USA, along with several national and international research and academic institutions. The three institutes leading the project in India are Inter-University Centre for Astronomy and Astrophysics in Pune, Raja Ramanna Centre for Advanced Technology in Indore and the Institute of Plasma Research in Ahmedabad.

The lecture can we watched here

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