

SCIENCE CENTRE NEWS LETTER

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SCIENCE CENTRE

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WHAT'S NEW IN SCIENCE?

Physics Nobel Awarded for Black Hole Breakthroughs in 2020

Black holes have recently come into the light. Last year, a global network of telescopes glimpsed the silhouette of a super massive black hole at the center of a neighboring galaxy. Gravitational wave detectors now regularly sense the tremors of invisible, faraway black hole collisions.

Year 2020's Nobel Prize in Physics has been awarded for earlier work that indirectly established the existence of black holes. The English mathematical physicist Roger Penrose won half the prize for his 1965 paper showing that "black hole formation is a robust prediction of the general theory of relativity," according to the Nobel committee. The other half was shared by rival astrophysicists Reinhard Genzel and Andrea Ghez, who made groundbreaking observations of stars orbiting the Milky Way's center that suggested that a supermassive, invisible, compact object must reside there.

Black holes are regions that contain so much matter packed within so little space that gravity has a runaway effect: The matter collapses toward a central point of immense density, called a singularity. Everything within a certain distance of the singularity becomes gravitationally trapped, destined to fall inward. Even light that passes inside the black hole's spherical surface of no return, called the event horizon, gets sucked in, which

makes black holes invisible.

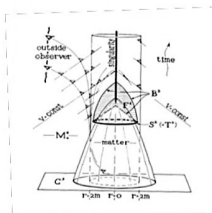
What did Roger Penrose figure out about black holes?

Roger Penrose made his key contribution in 1965, not long after the discovery of superluminous objects called quasars. These objects were so bright that researchers hypothesized that they might be the gleam of material falling into ultra-compact, supermassive objects. This renewed interest in the decades-old question of whether black holes were just a mathematical artifact of Einstein's theory, or if they actually form in the universe.

Penrose showed that they can. In fact, he showed that they inevitably do.

How did Genzel and Ghez prove that Sagittarius A* is a supermassive black hole?

They tracked the motions of stars that swing very close by. If Sagittarius A* was an extended cluster of material, then stars passing through would be pulled on from multiple directions, and their resulting orbits would be unremarkable. But if it was a compact super massive black hole, then the stars should whip by at high speeds. Those of several other close-in stars, indicated that Sagittarius A* measures less than 125 times the distance between Earth and the sun, even though it contains 4 million solar masses. It could only be a super massive black hole.

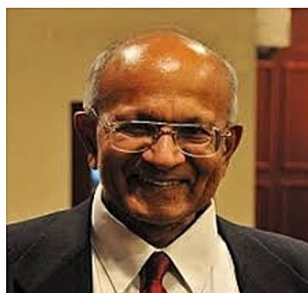


SCIENTIST OF THE MONTH

Abhay Bhushan

Abhay Bhushan was born on 23 November 1944 at Allahabad, Uttar Pradesh. He was a graduate from the Indian Institute Of Technology, Kanpur. He received Masters degree in Electrical Engineering from Massachusetts Institute of Technology (MIT), USA. Together with a degree in Management from MIT Solan school of Management. At MIT, he worked on developing FTP and E-mail protocols for the ARPANet and subsequent Internet. In 1978 he

was a Director at the Institute of Engineering and Rural Technology in Allahabad and was also a senior manager in Engineering and development of Xerox where he was a founder and manager of the Xerox Environmental Leadership. He also was a Co-founder of both the Yield UP International and Portola communication.





Timings

Tuesday to Friday
9.30 am to 4.30 pm

Saturday - Sunday
& Public Holidays
11.00 am to 6.30 pm

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SCIENCE FACTS NOVEMBER 2019

Aviation Month, Good Nutrition Month, National Diabetes Awareness Month

3 rd Nov 1957	Soviet Union launched an artificial Earth Satellite "Sputnik-2" which was the first satellite to carry a living organism i.e. A dog named 'Laika'.
3 rd Nov 1960	America launched "Explorer 8" satellite into the space to discover atmospheric Composition of the Ionosphere.
5 th Nov 1855	French Meteorologist Leon Teisserenc de Bort (Discoverer of Stratosphere) was born.
6 th November	International Day for preventing the Exploitation of the Environment in war and Armed conflict. (Recognised by U.N.)
7 th Nov 1867	French Scientist Mary Curie (Discoverer of Radium) was born.
7 th Nov 1888	Indian Famous Scientist Chandrashekhar Raman (Discoverer of Raman Effect) was born.
8 th Nov 1922	South African Surgeon Christian Bernard (Who made first successful Heart Transplant) was born.
9 th Nov 1801	Gail Borden (Father of Modern Dairy Industry) was born.
9 th Nov 1897	British Chemist Ronald G.W. (Inventor of Flash Photolysis Methodology) was born.
10 th November	World Science Day for Peace & Development (by UNESCO)
12 th Nov 1896	Dr. Salim Ali (Internationally honoured Indian Ornithologist known as "Birdman of India") was born.
13 th Nov 1893	American Bio-chemist Adverd A Doicy (Inventor of process to make Vitamin K1) was born.
14 th November	World Diabetes Day [by WHO]
14 th Nov 1776	Henri Dutrochet (discoverer of process of Osmosis) was born on this day
14 th Nov 1863	Belgian Chemist Leo Baekeland (Inventor of Bakelite) was born.
18 th Nov 1897	British Physicist Petrik M.S.Bleckett (Discoverer of Nuclear Reaction) was born.
19 th Nov 1997	Kalpna Chawala's (First Woman Astronaut of Indian Origin) first flight in space.
19 th Nov 1912	Cell Biologist George E Palade (Discoverer of Ribosomen) was born.
20 th November	Universal Children's Day. (by U.N.)
21 th November	World Television Day. (by U.N.)
29 th Nov 1803	Austrian Physicist Christian Doppler (Discoverer of Doppler effect Radar) was born.
30 th Nov 1858	Sir Jagdishchandra Bhagwanchandra Bose (Great Indian Scientist and Botanist) was born.
30 th Nov 1917	Sir Jagdishchandra Bose started "Bose Research Institute" for research on Plants and Animals at Calcutta.
<p>U. N. : United Nations WHO : World Health Organization UNESCO : United Nations Educational Scientific & Cultural Organization</p>	

Ans :- 1. C 2. D 3. B 4. C 5. C 6. D 7. B 8. C

SCIENTIFIC QUESTION

What makes electromagnetic radiation?

Electromagnetic radiation is a form of energy. The light that we see is a type of electromagnetic radiation. However it is only a very small part of the entire electromagnetic spectrum. Sound, another form of energy, is not part of this spectrum. Electromagnetic radiation is different from sound in that it can travel in space and does not need a medium like air or water to travel through.

Electromagnetic radiation is made when an atom absorbs energy. The absorbed energy causes one or more electrons to change their locale within the atom.

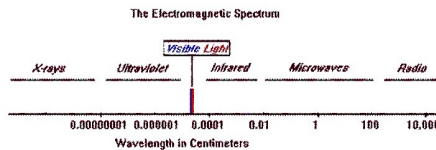
When the electron returns to its original position, an electromagnetic wave is produced.

Depending on the kind of atom and the amount of energy, this electromagnetic radiation can take the form of heat, light, ultraviolet, or other electromagnetic waves.

There are several ways of causing atoms to absorb energy. One way is to excite the atoms with electrical energy. We do this in neon signs. The electricity we put through the neon tubes will excite

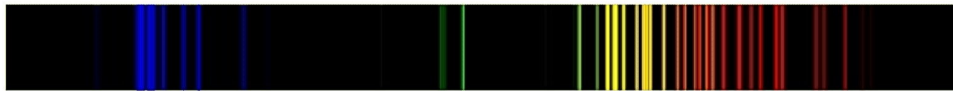
or add energy to the neon atoms. These electrons in these atoms are then in a high energy state. The electrons don't like to be in the high energy state and will fall back down into the low energy state giving off radiation which we see as light.

This explains why we see light but doesn't explain why neon signs are a reddish-purple. (Neon signs are other colors, but that is because they are made out of colored glass.) The reason why neon signs are a certain color is because when a gas is excited by electricity, it tends to only emit certain colors.



An observant student might now ask -- I see how light can produce colors now, but where does white light come from? The answer is that it comes from all the colors. When you take all the colors and combine them then you will get white. If we place sunlight or light from an incandescent light bulb through

a prism we would see the following spectrum:



Now this spectrum looks different from the neon light because it is continuous. It is an entire band of light and not just several different lines. The reason why this spectrum looks different is because it was not generated by electricity exciting particular gases. It was generated by heat exciting

atoms. In both a light bulb and on the Sun, the atoms are heated

to a very high temperature. This temperature is hot enough to excite atoms into giving off light. This light given off is in a continuous color spectrum.



KNOW THE EXHIBIT

Cycloid

This exhibit is situated between Ticket Window and Souvenir Shop at Science Centre.

A Cycloid is the curve produced by tracing the path of a fixed point on a circle as that circle rolls along a straight path. The arc length of a single cycloidal arch is precisely 8 times the radius of the generating circle and the area under such an arch is exactly 3 times the area of the generating circle. They are mainly used in Kinematics, design of Gear tooth profile for rotary pumps and watches etc.



SCIENCE QUIZ

1. There are _____ number of muscles in human body.
(A) 638 (B) 637 (C) 639 (D) 640
2. What is the life span of RBC?
(A) 130 days (B) 110 days (C) 100 days (D) 120 days
3. The number of ribs in a human body is _____.
(A) 23 (B) 24 (C) 25 (D) 22
4. Which is the largest blood vessel in the human body?
(A) Alveoli (B) Artery (C) Aorta (D) Vein
5. Which of the following is in liquid form at room temperature?
(A) Lithium (B) Sodium (C) Francium (D) Cerium
6. Which of the following are the metals included in of gun metal?
(A) Iron, Zinc, Titanium (B) Iron, tin (C) Iron, Brass, Tin (D) Copper, Tin
7. Brass gets discolored in air because of the presence of which of the following gases in air?
(A) Oxygen (B) Hydrogen Sulphide (C) Carbon Dioxide (D) Nitrogen
8. Galvanised iron sheets have a coating of
(A) lead (B) chromium (C) zinc (D)tin

SCIENCE PROJECT

Surat Municipal Corporation had organized Science Fair at Art Gallery, Science Centre, Surat on 30 and 31st August, 2019. L. P. savani Academy, Vesu had presented their Project on "Voice Controlled Car"

Aim of the project was design a car for transportation and safety purpose.

This voice controlled car is based on Arduino software which is connected with bluetooth device for giving voice-command through mobile phone.

We can use SONAR system for obstacle detecting for better transport and avoid accident. It can move left, right, forward, backward, turn around.

