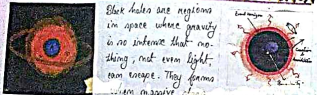


Deptt. of h s i s

BLACK HOLES AND HAWKING RADIATION



Black holes are regions in space where gravity is so intense that nothing, not even light, can escape. They form when massive stars collapse under their own gravity, compressing all their mass into a singularity, surrounded by an event horizon. The formation of black holes in the 1930s by physicist Karl Schwarzschild. He introduced the concept of Hawking radiation, which suggests that black holes emit radiation.

Submitted by: Deep Soma

5th Sem (H)

The Multiverse Theory



The multiverse theory suggests that our universe might be just one of many universes that exist. These parallel universes, collectively known as the multiverse, could vary in fundamental ways - having different physical laws, constants, or even different types of matter and energy. There are several versions of the multiverse theory. In cosmology, the idea stems from inflation theory, which posits that the Big Bang space expanded rapidly. This inflation might have created "bubble universes" within a vast cosmic landscape, each with its own properties. In quantum mechanics, the Many Worlds Interpretation suggests that every quantum event spawns a new universe, where different outcomes occur simultaneously. For example, in one universe, you take one path in life, while in another, a different choice leads to a completely different outcome. The multiverse theory challenges our understanding of reality and raises profound questions: Could there be versions of ourselves living different lives in other universes? What is the true extent of the multiverse, and is it infinite? A compelling and speculative idea that probes the boundaries of modern physics and technology, offering a broader perspective on the nature of existence.



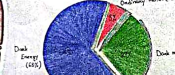
Equations that changed the WORLD

1. Pythagorean theorem: $a^2 + b^2 = c^2$
(Pythagoras, 500 BC)
2. Wave equation: $\frac{\partial^2 \psi}{\partial x^2} = -k^2 \psi$
(J. J. Thomson, 1896)
3. Euler's FORMULA FOR POLYHEDRA: $V - E + F = 2$
(L. Euler, 1761)
4. Normal distribution: $\phi(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{x^2}{2\sigma^2}}$
(C. F. Gauss, 1809)
5. Maxwell's Equation: $\nabla \cdot E = \rho$
(J. C. Maxwell, 1861)
6. RELATIVITY: $E = mc^2$ (Einstein, 1905)
7. Schrödinger's Equation: $\hat{H}\psi = E\psi$
(E. Schrödinger, 1926)
8. Chaos Theory: $x_{n+1} = R x_n (1 - x_n)$
(R. May, 1976)
9. Information theory: $H(X) = -\sum p_i \log_2 p_i$
(C. Shannon, 1948)
10. Black-Scholes Equation: $\frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS \frac{\partial V}{\partial S} - rV = 0$
(F. Black, S. Scholes, 1973)

Submitted by: Pooja Das, 2nd year

Dark Matter and Dark Energy

Composition of the Universe



Dark matter and dark energy are the most mysterious components of the universe, yet they make up 95% of its total mass and energy. Dark matter is thought to be an invisible substance that interacts with ordinary matter through gravity, but not through light. It is believed to be made up of particles that do not emit, absorb, or reflect light. Dark energy, on the other hand, is a form of energy that is thought to be responsible for the accelerating expansion of the universe. It is a mysterious force that counteracts the attractive force of gravity, causing the universe to expand at an ever-increasing rate.

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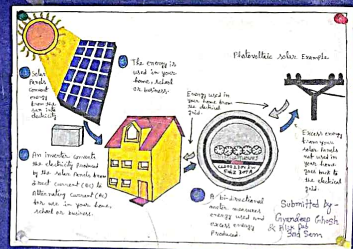
CHAOS THEORY AND THE BUTTERFLY EFFECT

Chaos theory studies systems that are extremely sensitive to initial conditions, where small changes can lead to vastly different outcomes, making long-term prediction impossible. The Butterfly Effect, introduced by Edward Lorenz, illustrates this by suggesting that a butterfly's wings flapping in Brazil could trigger a tornado in Texas. Chaos theory challenges the idea that the universe is entirely predictable, showing that even deterministic systems can behave "unpredictably." It has broad applications, from weather forecasting to economics, highlighting the limits of predictability in complex systems and how order can emerge from apparent randomness.



Submitted by: Deep Soma

5th Sem (H)



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