

Lecture 15 : General Theory of Relativity



The total solar eclipse of 29 May 1919 which helped Sir Arthur Eddington to test and established the General Theory of Relativity formulated by Albert Einstein. [Image Credit: <https://www.eso.org/public/images/potw1926a/>]

This theory of gravitation due to Einstein is regarded as the most beautiful of all physical theories. Einstein realized that Newton's theory of gravitation needed to be modified because it was inconsistent with his special theory of relativity. But, instead of taking care of this inconsistency in a straightforward way, he chose to be radical. He was unhappy with a magical element in Newton's theory, namely, Newton introduced two different masses, Inertial mass and Gravitational mass, only to set them equal to one another. This led Einstein to the revolutionary idea that gravity is not a force, but that the acceleration due to gravity is due to the curvature of space and time. In this lecture, I shall explain in simple language how Einstein was led to his new theory of gravity.

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[Supplementary Material : Dr. Sushan Konar]



Suggested References

1. Text Books

- (a) C. W. Misner, K. S. Thorne & J. A. Wheeler, 2017, *Gravitation*, Princeton University Press
- (b) J. V. Narlikar, 2010, *An Introduction to Relativity*, Cambridge University Press, South Asian Edition
- (c) B. Schutz, 2022, *A First Course in General Relativity*, Cambridge University Press
- (d) R. M. Wald, 2006, *General Relativity*, Overseas
- (e) S. Weinberg, 2008, *Gravitation and Cosmology : Principles and Applications of the General Theory of Relativity*, Wiley

2. Popular Articles and Books

- (a) P. Davies, *The Thought that Counts*, **New Scientist**, May 1995
- (b) G. Gammow, *Gravity*, *Scientific American*, March 1961
- (c) G. Gammow, 2018, *Gravity*, General Press
- (d) J. Gribbin, 2016, *Einstein's Masterwork: 1915 and the General Theory of Relativity*, Pegasus Books

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