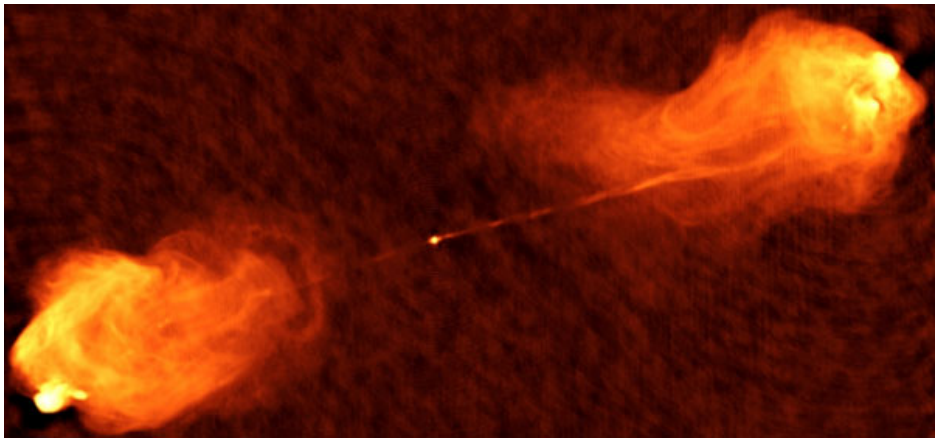
Lecture 14 : Special Theory of Relativity



The apparent one-sidedness of relativistic jets of radio galaxies, like that seen in Cygnus-A (picture above), one of the strongest radio sources known till date, was predicted by Sir Martin Rees and (his then student) Roger Blandford through the application of relativistic Doppler boosting. [Image courtesy : *Sky & Telescope*]

In 1687, Newton published his Principia, considered the greatest intellectual achievement by mankind. In that, he stated his Laws of Motion. He also stated a Principle of Relativity. More than two centuries later, Einstein felt that this principle needed to be generalized to include all laws of physics, and not just the laws of motion. But he faced a serious difficulty in accommodating the great discovery by Maxwell that the velocity of light is absolute. In order to accommodate this, he had to abandon two key assumptions of classical physics, namely, the absoluteness of space and time. And when he abandoned the concept of the absoluteness of space and time, several consequences emerged which were truly revolutionary. After a brief introduction, this lecture explains a few dramatic consequences of Einsteins Special Theory of Relativity in astronomical contexts.

As this lecture is intended to be a rapid review of Special Relativity, no specific problem has been suggested. Instead, a list of introductory texts is being given. A set of astronomically relevant reading material (on both Special & General Theory of Relativity) would be provided after the next lecture.

- R. Resnick, 2007, ***Introduction To Special Relativity***, Wiley
- S. Susskind & A. Friedman, 2011, ***Special Relativity and Classical Field Theory***, Penguin
- L. D. Landau & E. M. Lifshitz, 1987, ***The Classical Theory of Fields***, Butterworth-Heinemann

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Prepared by Dr. Sushan Konar : ***sushan.konar@gmail.com***