

### Offered Title: A (very) Brief History of Hawking

The twentieth century saw a renaissance in physics. There were many who played an important role in the advances we witnessed, but only a handful who charted new directions.

Stephen Hawking (1942 – 2018) was a charter.

Although he apparently did not like to study much, Stephen's ability to capture, absorb, and understand complex ideas helped him earn a first-class BA (Honors) degree and go on to Cambridge for graduate work.

A diagnosis of amyotrophic lateral sclerosis (ALS) or Lou Gehrig's disease sent Stephen into a funk during his graduate level studies at Cambridge. Duh! This was on top of the disappointment of not being assigned to work with Fred Hoyle, a revered astronomer and proponent of the 'Steady State' theory. I think his assignment to work with a general relativity cosmologist instead was fortuitous. As we all know (I hope), the Steady State theory lost out to the Big Bang...so far.

The unusually slow progression of his disease coupled with encouragement from his supervisor stimulated Stephen to continue his studies, and he even challenged Fred Hoyle's work at a lecture in 1964. This while he could barely walk, and his speech difficult to understand!

The time was right for the likes of Stephen Hawking. Einstein had set the table with Relativity, and the then current (1964) debate over Steady State and Big Bang served up an all you can eat Smorgasbord of possibilities.

Along with winning his PhD in applied mathematics and theoretical physics in 1966, he tied with another charter, Roger Penrose, for the prestigious Adams Prize given by Cambridge. This for his essay "Singularities and the Geometry of Space-Time".

Hawking and Penrose would collaborate for years on various projects and in a 1970 paper, they extended Relativity and Cosmology by postulating the universe as starting from a singularity. The Big Bang.

Not everything Hawking proposed however was accepted. He came up with a set of laws for black hole mechanics, including the prospect that information is lost forever after passing through the event horizon, that is...black holes do not shrink. This concept came into question and that challenged Stephen to direct his efforts toward a better conceptual description.

Hawking turned to quantum mechanics and was able to derive his new theory, that black holes do "leak" information (radiation), by expanding on work by Zel'dovich, Starobinsky, and Bekenstein. This leakage is now called Hawking, Hawking-Bekenstein, or Hawking-Zel'dovich radiation. It is considered a breakthrough concept and the Fermi space telescope currently looks for the terminal gamma-ray flashes of an evaporating black hole.

Stephen Hawking's impact on physics is implicit, and his ability to generate interest in science via books, movies, and television appearances is comparable with Carl Sagan's. RIP SH.

### What's in the Sky?

March 29; Before sunrise: Find the "teapot" of Sagittarius in the southwest. Mars, Saturn and globular cluster M22 share a binocular field above the teapot's lid. Should be a pretty sight.