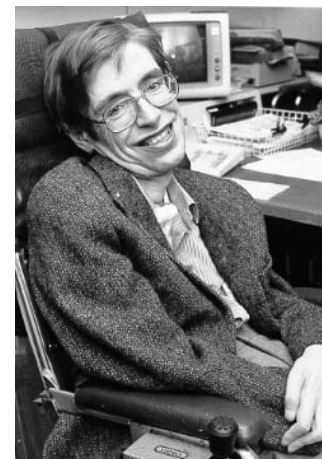


GREAT MINDS IN SCIENCE

Stephen Hawking

Stephen Hawking, born in 1942 in Oxford, England, is a British theoretical **physicist** and **mathematician** whose main field of research has been the nature of space and time, including irregularities in **space** and **time** known as singularities. Hawking has devoted much of his life to making his theories accessible to the public through lectures, books, and films.

Hawking showed exceptional talent in mathematics and physics from an early age. He entered **Oxford University** in 1958 and became especially interested in **thermodynamics** (the study of the interaction of matter and energy), **relativity theory**, and **quantum mechanics**. He completed his undergraduate courses in 1962 and received a bachelor's degree in physics. Hawking then enrolled as a research student in general relativity at the department of applied mathematics and theoretical physics at the University of Cambridge. Hawking earned his Ph.D. degree from Trinity College at the University of Cambridge in 1966. He stayed at the University of Cambridge, doing post-doctoral research, until he became a professor of physics in 1977. He became one of the youngest fellows of the Royal Society in 1974. In 1979 he was appointed **Lucasian Professor of Mathematics** at Cambridge.



During his postgraduate program, Hawking was diagnosed as having **Amyotrophic Lateral Sclerosis** (ALS), a rare progressive disease that handicaps movement and speech. This disease makes it necessary for Hawking to carry out the long and complex mathematical calculations that his work requires in his head. He has been able to continue his studies and to embark upon a distinguished and productive scientific career despite his illness.

From its earliest stages, Hawking's research has been concerned with the concept of **singularities**—breakdowns in space and time where the classic laws of physics no longer apply. The most familiar example of a singularity is a black hole, the final form of a collapsed star. During the late 1960s, Hawking proved that if the **general theory of relativity** is correct, then a singularity must also have occurred at the *big bang*.

In 1970 Hawking's research turned to the examination of the properties of **black holes**. Hawking realized that the surface area of the event horizon, the boundary of a black hole, around a black hole could only increase or remain constant with time—this area could never decrease. From 1970 to 1974, Hawking and his associates provided mathematical proof for the hypothesis formulated by American physicist John Wheeler known as the “No Hair Theorem.” Since 1974, Hawking has studied the behaviour of matter in the immediate vicinity of a black hole from a theoretical basis in quantum mechanics. He found, to his initial surprise, that black holes—from which nothing was supposed to be able to escape—could emit thermal radiation, or heat.

Throughout the 1990s Hawking sought to produce a theory that could connect several theories used by scientists to explain the universe. This theory would combine quantum mechanics and relativity to form a quantum theory of gravity (*see* **Unified Field Theory**). Such a unified physical theory would incorporate all four basic types of interactions between matter and energy: strong nuclear interactions, weak nuclear interactions, electromagnetic interactions, and gravitational interactions.