Stephen William Hawking (8 January 1942 – 14 March 2018) was an English theoretical physicist, cosmologist, and author who, at the time of his death, was director of research at the Centre for Theoretical Cosmology at the University of Cambridge.[6][17][18] Between 1979 and 2009, he was the Lucasian Professor of Mathematics at the University of Cambridge, widely viewed as one of the most prestigious academic posts in the world.[19]

Hawking was born in Oxford into a family of physicians. In October 1959, at the age of 17, he began his university education at University College, Oxford, where he received a first-class BA degree in physics. In October 1962, he began his graduate work at Trinity Hall at the University of Cambridge where, in March 1966, he obtained his PhD degree in applied mathematics and theoretical physics, specialising in general relativity and cosmology. In 1963, at age 21, Hawking was diagnosed with an early-onset slow-progressing form of motor neurone disease that gradually, over decades, paralysed him.[20][21] After the loss of his speech, he communicated through a speech-generating device initially through use of a handheld switch, and eventually by using a single cheek muscle.[22]

Hawking's scientific works included a collaboration with Roger Penrose on gravitational singularity theorems in the framework of general relativity, and the theoretical prediction that black holes emit radiation, often called Hawking radiation. Initially, Hawking radiation was controversial. By the late 1970s and following the publication of further research, the discovery was widely accepted as a major breakthrough in theoretical physics. Hawking was the first to set out a theory of cosmology explained by a union of the general theory of relativity and quantum mechanics. He was a vigorous supporter of the many-worlds interpretation of quantum mechanics.[23][24]

Hawking achieved commercial success with several works of popular science in which he discussed his theories and cosmology in general. His book *A Brief History of Time* appeared on the *Sunday Times* bestseller list for a record-breaking 237 weeks. Hawking was a Fellow of the Royal Society, a lifetime member of the Pontifical Academy of Sciences, and a recipient of the Presidential Medal of Freedom, the highest civilian award in the United States. In 2002, Hawking was ranked number 25 in the BBC's poll of the 100 Greatest Britons. He died in 2018 at the age of 76, after having motor neurone disease for more than 50 years.

Early life

Family

Hawking was born on 8 January 1942[25][26] in Oxford to Frank and Isobel Eileen Hawking (*née* Walker).[27][28] Hawking's mother was born into a family of doctors in Glasgow, Scotland.[29][30] His wealthy paternal great-grandfather, from Yorkshire, over-extended himself buying farm land and then went bankrupt in the great agricultural depression during the early 20th century.[30] His paternal great-grandmother saved the family from financial ruin by opening a school in their home.[30] Despite their families' financial constraints, both parents attended the University of Oxford, where Frank read medicine and Isobel read Philosophy, Politics and Economics.[28] Isobel worked as a secretary for a medical research institute, and Frank was a medical

researcher.[28][31] Hawking had two younger sisters, Philippa and Mary, and an adopted brother, Edward Frank David (1955–2003).[32]

In 1950, when Hawking's father became head of the division of parasitology at the National Institute for Medical Research, the family moved to St Albans, Hertfordshire.[33][34] In St Albans, the family was considered highly intelligent and somewhat eccentric;[33][35] meals were often spent with each person silently reading a book.[33] They lived a frugal existence in a large, cluttered, and poorly maintained house and travelled in a converted London taxicab.[36][37] During one of Hawking's father's frequent absences working in Africa,[38] the rest of the family spent four months in Mallorca visiting his mother's friend Beryl and her husband, the poet Robert Graves.[39]

Primary and secondary school years

Hawking began his schooling at the Byron House School in Highgate, London. He later blamed its "progressive methods" for his failure to learn to read while at the school.[40][33] In St Albans, the eight-year-old Hawking attended St Albans High School for Girls for a few months. At that time, younger boys could attend one of the houses.[39][41]

Hawking attended two private (i.e. fee-paying) schools, first Radlett School[41] and from September 1952, St Albans School, Hertfordshire,[26][42] after passing the eleven-plus a year early.[43] The family placed a high value on education.[33] Hawking's father wanted his son to attend Westminster School, but the 13-year-old Hawking was ill on the day of the scholarship examination. His family could not afford the school fees without the financial aid of a scholarship, so Hawking remained at St Albans.[44][45] A positive consequence was that Hawking remained close to a group of friends with whom he enjoyed board games, the manufacture of fireworks, model aeroplanes and boats,[46] and long discussions about Christianity and extrasensory perception.[47] From 1958 on, with the help of the mathematics teacher Dikran Tahta, they built a computer from clock parts, an old telephone switchboard and other recycled components.[48][49]

Although known at school as "Einstein", Hawking was not initially successful academically.[50] With time, he began to show considerable aptitude for scientific subjects and, inspired by Tahta, decided to read mathematics at university.[51][52][53] Hawking's father advised him to study medicine, concerned that there were few jobs for mathematics graduates.[54] He also wanted his son to attend University College, Oxford, his own *alma mater*. As it was not possible to read mathematics there at the time, Hawking decided to study physics and chemistry. Despite his headmaster's advice to wait until the next year, Hawking was awarded a scholarship after taking the examinations in March 1959.[55][56]

Undergraduate years

Hawking began his university education at University College, Oxford,[26] in October 1959 at the age of 17.[57] For the first eighteen months, he was bored and lonely – he found the academic work "ridiculously easy".[58][59] His physics tutor, Robert Berman, later said, "It was only necessary for him to know that something could be done, and he could do it without looking to

see how other people did it."[2] A change occurred during his second and third years when, according to Berman, Hawking made more of an effort "to be one of the boys". He developed into a popular, lively and witty college-member, interested in classical music and science fiction.[57] Part of the transformation resulted from his decision to join the college boat-club, the University College Boat Club, where he coxed a rowing-crew.[60][61] The rowing-coach at the time noted that Hawking cultivated a daredevil image, steering his crew on risky courses that led to damaged boats.[60][62] Hawking estimated that he studied about 1,000 hours during his three years at Oxford. These unimpressive study habits made sitting his finals a challenge, and he decided to answer only theoretical physics questions rather than those requiring factual knowledge. A first-class degree was a condition of acceptance for his planned graduate study in cosmology at the University of Cambridge.[63][64] Anxious, he slept poorly the night before the examinations, and the result was on the borderline between first- and second-class honours, making a *viva* (oral examination) with the Oxford examiners necessary.[64][65]

Hawking was concerned that he was viewed as a lazy and difficult student. So, when asked at the *viva* to describe his plans, he said, "If you award me a First, I will go to Cambridge. If I receive a Second, I shall stay in Oxford, so I expect you will give me a First."[64][66] He was held in higher regard than he believed; as Berman commented, the examiners "were intelligent enough to realise they were talking to someone far cleverer than most of themselves".[64] After receiving a first-class BA degree in physics and completing a trip to Iran with a friend, he began his graduate work at Trinity Hall, Cambridge, in October 1962.[26][67][68]

Post-graduate years

Hawking's first year as a doctoral student was difficult. He was initially disappointed to find that he had been assigned Dennis William Sciama, one of the founders of modern cosmology, as a supervisor rather than the noted astronomer Fred Hoyle,[69][70] and he found his training in mathematics inadequate for work in general relativity and cosmology.[71] After being diagnosed with motor neurone disease, Hawking fell into a depression – though his doctors advised that he continue with his studies, he felt there was little point.[72] His disease progressed more slowly than doctors had predicted. Although Hawking had difficulty walking unsupported, and his speech was almost unintelligible, an initial diagnosis that he had only two years to live proved unfounded. With Sciama's encouragement, he returned to his work.[73][74] Hawking started developing a reputation for brilliance and brashness when he publicly challenged the work of Fred Hoyle and his student Jayant Narlikar at a lecture in June 1964.[75][76]

When Hawking began his doctoral studies, there was much debate in the physics community about the prevailing theories of the creation of the universe: the Big Bang and Steady State theories.[77] Inspired by Roger Penrose's theorem of a spacetime singularity in the centre of black holes, Hawking applied the same thinking to the entire universe; and, during 1965, he wrote his thesis on this topic.[78][79] Hawking's thesis[80] was approved in 1966.[80] There were other positive developments: Hawking received a research fellowship at Gonville and Caius College at Cambridge;[81] he obtained his PhD degree in applied mathematics and theoretical physics, specialising in general relativity and cosmology, in March 1966;[82] and his essay "Singularities and the Geometry of Space–Time" shared top honours with one by Penrose to win that year's prestigious Adams Prize.[83][82]