



*The Nature of
Space and Time*

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Stephen Hawking
and Roger Penrose

1996

Einstein said that the most incomprehensible thing about the universe is that it is comprehensible. But was he right? Can the quantum theory of fields and Einstein's general theory of relativity, the two most accurate and successful theories in all of physics, be

united in a single quantum theory of gravity? In 1994, at the Isaac Newton Institute for Mathematical Sciences at the University of Cambridge, Stephen Hawking and Roger Penrose, two of the most important scientific thinkers of our time, argued over this key conundrum of the twentieth century via six alternating lectures and one final debate. This book captured the liveliness and high-minded quality of their extended argument.

Hawking contends that only a quantum theory of gravity, coupled with the no-boundary hypothesis (the idea that, in the direction of "imaginary time" or before the Big Bang, space-time is finite in extent but has no boundary or edge), can ever hope to explain adequately what little we can observe about our universe. Penrose, playing the realist to Hawking's positivist, thinks that the universe is unbounded and will expand forever. The universe can be understood, he argues, in terms of the geometry of light cones, the compression and distortion of space-time, and by the use of twistor theory (a rather radical new way of describing the geometry of space-time). In the final debate, the reader appreciates how much Hawking and Penrose diverge in their opinions of the ultimate quest to combine quantum mechanics and relativity, and how differently they have attempted to comprehend the incomprehensible.