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## Roger Penrose: Non-stop cosmos, non-stop career

10 March 2010 by [Michael Brooks](#)

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YOU'D have thought that Roger Penrose would be pleased to have his work immortalised in an Oscar-nominated film. Apparently not. After friends told him about his book's cameo in *Happy Go Lucky*, Penrose sat down to watch it. He didn't have to wait long: his book appears in the opening sequence. The lead character is browsing in a bookshop. She pulls Penrose's *Road to Reality* from a shelf, takes a look at the title and, putting it straight back, says, "Oh, we don't want to go there!"

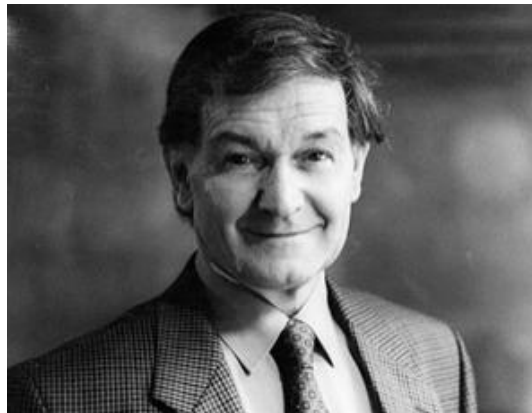
He is evidently disappointed by the treatment as, just for a moment, his bright, enthusiastic demeanour dims slightly. "I thought she would have at least opened the book then closed it rapidly," he says. "But she didn't even get that far." There's a good reason for that: having a look inside the book might have derailed the film. *Road To Reality* clocks in at more than 1000 pages and is replete with intricate diagrams and terrifying equations. Its contents are pretty much indecipherable to almost everyone on the planet. *Happy Go Lucky* it is not.

And yet - and here is the strange magic of Roger Penrose - it was a best-seller. Despite being impossibly successful in academia, Penrose seems to have the common touch. This is, after all, the mathematician who gave the artist M. C. Escher - also an esoteric yet popular figure - some of his best ideas. Penrose is also the mathematician most frequently mistaken for a physicist: in 1965 he produced the mathematics that showed how stars collapse to form black holes. More recently, Ed Witten, the founder of string theory, has been using another of Penrose's creations - [twistor theory](#) - to try to reduce string theory's 11 dimensions to a more manageable four.

Penrose, who is 80 next birthday, is still making incursions into physics. He has just handed his publisher the manuscript for his next book, a rewrite of cosmological theory. There are those, I hesitantly suggest, who say that mathematicians would normally have ceased being this productive long ago. "Well," he says with a grin, "I can't help that, can I?"

Indeed not; Penrose was born into a family of over-achievers. One brother is a chess grandmaster, another is a theoretical physicist and a fellow of the Royal Society. Their father was a professor of human genetics at University College London, and filled the house with a reverence for scholarship. One day, Penrose remembers, he came home from school and told his father his class would be learning calculus the following day. "This terrified expression came over his face," Penrose recalls. "He stopped what he was doing, took me over into the corner and taught me calculus. He didn't want somebody else to have the pleasure of teaching his son something so wonderful."

And so it began. Where it will end is anyone's guess, but *Cycles of Time: An extraordinary new view of the universe* is the next stop. The ideas in the book came to him five years ago, when he was worrying about the state of the universe. According to the standard view, dark energy will lead the universe into an eternal accelerating expansion. Every bit of matter will eventually lose contact with every other bit. "It all just seemed unbelievably boring to me," Penrose says.



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Then he found something interesting within it: at the very end of the universe, the only remaining particles will be massless. That means everything that exists will travel at the speed of light, making the flow of time meaningless. After a few mathematical manipulations of infinity, out popped a never-ending universe, where new big bangs are the inevitable result of a universe's demise. In Penrose's theory, one cosmos leads to another. "I used to call it a crazy scheme, but I'm starting to believe it now," he says.

Penrose knows he is not the first to suggest endless loops of time. The [ekpyrotic universe model](#), suggested by Paul Steinhardt and Neil Turok, tells a similar story. But, he says, their ideas come from string theory. And that, to Penrose, is a Bad Thing.

Penrose has no time for strings. "My main objection is all those extra dimensions, which don't make any sense," he says. Witten aside, says Penrose, string theorists are not facing up to their problems. "I don't see string theory converging on anything. In fact, it's diverging: it has got wilder and wilder."

That's part of the reason why, after *Cycles of Time*, he will publish *Fashion, Faith and Fantasy in the New Physics*, a critique of modern physics. String theory provides the "fashion", but there are other targets too.

The "faith" is the idea that quantum mechanics is fundamental to the universe. Not that Penrose wants to take anything away from quantum theory. It is, he says, spectacularly successful in describing what happens on subatomic scales. But that doesn't mean it's the final answer to describing every aspect of reality. What's more, he says, it has opened the floodgates for every flaky idea under the sun. "Quantum mechanics is so successful and so non-intuitive that people think they can have any old theory they like and it could be perfectly true," he says.

And the fantasy? Inflationary cosmology: the idea that, a few moments after the big bang the universe took just a fraction of a second to expand from the size of a pea to the size of the Milky Way.

Penrose is not cowed by the fact that inflation now sits slap bang in the middle of the cosmological mainstream.

Few people would dare to attack the three main arms of modern physics in one hefty swipe, but Penrose obviously enjoys his status as a maverick, and is flattered by criticism from his scientific colleagues. Theorist Frank Wilczek at the Massachusetts Institute of Technology called *Road to Reality* "deeply flawed", saying that Penrose had sidestepped his responsibility to respond to his academic critics, go into details, or deal with experimental facts. "Galileo pulled this off brilliantly, but times were much simpler then," Wilczek said. Penrose's response? "I consider he paid me an enormous compliment by comparing me unfavourably with Galileo."

## Few would dare to attack the three arms of modern physics in one hefty swipe

New Galileo or not, few people could carry off Penrose's coups with such aplomb and so little collateral damage: after decades in science and a number of significant contributions, Penrose has countless admirers and few enemies. Perhaps that is because it is impossible not to like him. He is, in his own words, an incurable optimist, someone who is as excited about seeing his 9-year-old son building Lego robots as he is about solving the puzzles of the universe. The smile rarely disappears from his face, even when he tells of receiving "an awful lot of nutmail". With two more books on the way, that mailbag is certain to fill up again, but that won't put him off. "Stop? No, why would I do that?" he says.

## Profile

Roger Penrose is an emeritus professor of mathematics at the University of Oxford. His contributions to mathematics include showing that classical general relativity breaks down in the centre of a black hole, and twistor theory, which addresses the geometry of space-time

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