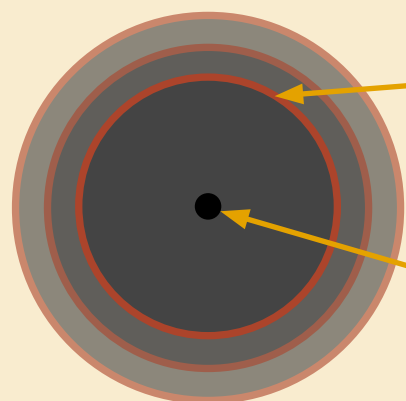


2020 NOBEL PRIZE IN PHYSICS



Awarded to **Roger Penrose** for showing that the general theory of relativity leads to black hole formation, and to **Reinhard Genzel & Andrea Ghez** for discovering a supermassive black hole at the centre of our galaxy.



EVENT HORIZON

The point at which gravity is strong enough that even light can't escape.

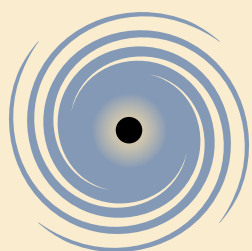
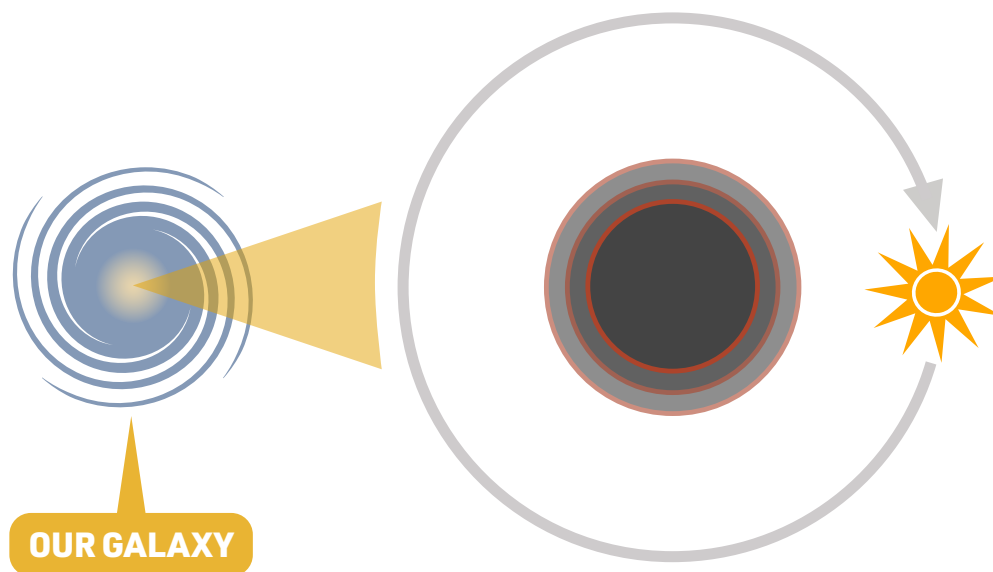
THE SINGULARITY

Density and gravity become infinite and time stops.

Originally, black holes were considered to be theoretical. Einstein, famed for his general theory of relativity, expressed doubts about their existence. However, in 1965, **Roger Penrose** used new mathematical models to prove that black holes could form as a consequence of Einstein's general theory of relativity. He described them in detail and showed that at their centre is a singularity, at which the laws of physics cease to operate.

Reinhard Genzel and **Andrea Ghez** led research groups which mapped the orbits of some of the brightest stars close to the centre of our galaxy. To do this they had to develop new techniques to compensate for distortions to their observations caused by the Earth's atmosphere.

The results from both groups showed that the stars near our galaxy's centre move rapidly. They showed that this is due to the centre of our galaxy containing a concentrated mass equivalent to 4 million times the mass of our sun: a supermassive black hole.



WHY DOES THIS RESEARCH MATTER?

The work of this year's winners has provided evidence for the existence of black holes. It also raises further unanswered questions about black hole structure and how they match theoretical predictions.

Nobel Prize in Physics Press release: <https://www.nobelprize.org/uploads/2020/10/press-physicsprize2020.pdf>