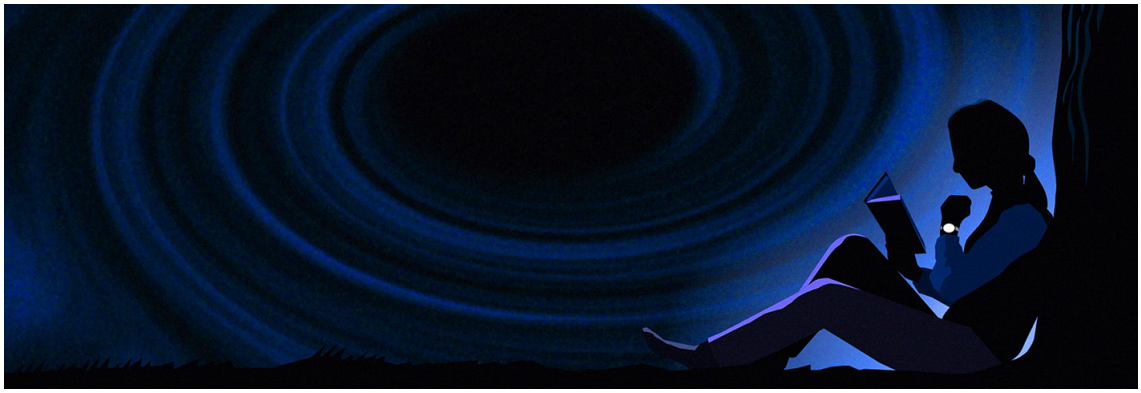
THE NOBEL PRIZE

Student Worksheet – Physics Prize 2020
Black holes and the Milky Way's darkest secret



What happens if a large star burns out and collapses under its own weight? Could it form something with such powerful gravitational force that nothing can escape from it? Has this ever actually happened anywhere in the universe? Roger Penrose, Reinhard Genzel and Andrea Ghez have made contributions that help answer these questions.

Roger Penrose has developed mathematical methods for exploring Albert Einstein's general theory of relativity. He showed that the theory in fact leads to the formation of black holes that capture everything that enters them. Nothing – not even light – can escape. Space and time become completely different from the way we perceive them here on earth.

Reinhard Genzel and **Andrea Ghez** have searched for a black hole at the centre of our galaxy, the Milky Way. Because black holes don't allow anything to get out, they are invisible. Genzel and Ghez have studied how the stars in the middle of the Milky Way move. They have determined that these stars orbit around something tremendously heavy – something that has to be a black hole.

Vocabulary

BLACK HOLES Black holes can form as the last phase in the life of a star. A black hole is incredibly heavy in relation to its size. If our planet were to become as dense and compact as a black hole, it would be a ball less than a centimetre wide!

THE GENERAL THEORY OF RELATIVITY The theory was formulated by Albert Einstein in 1915 and tied together our concepts of space, time and gravity in a completely new way.

What do you think?

What is the most interesting part of the laureates' work?

Alfred Nobel wanted the Nobel Prizes to be awarded to people who worked for the greatest benefit to humankind. What do you think is the importance of the laureates' contributions?