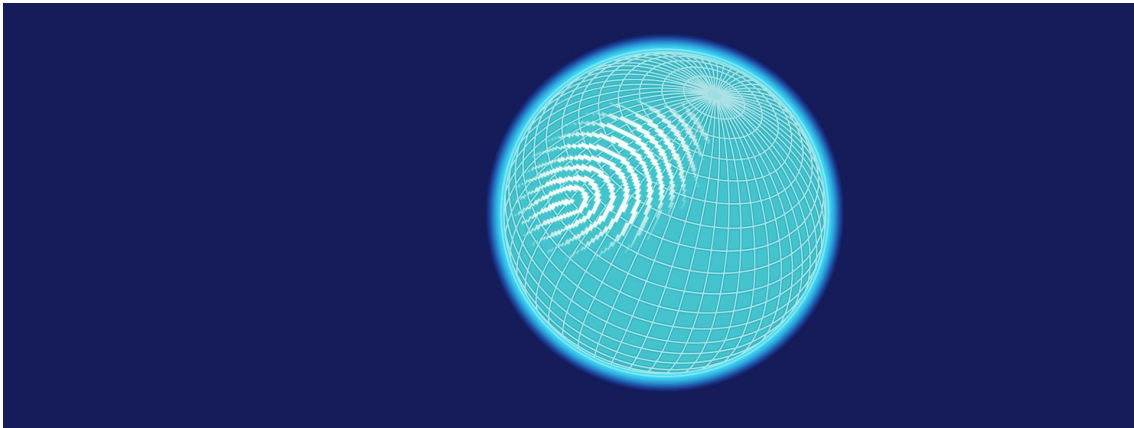


Student worksheet – Physics prize 2021 Hidden patterns in the climate and in other complex phenomena



Our world is full of complex and disordered phenomena and processes. The climate is an example of a complex system. Syukuro Manabe, Klaus Hasselmann and Giorgio Parisi have developed models for describing and understanding such systems.

Syukuro Manabe and **Klaus Hasselmann** have developed models to describe the earth's climate. These models demonstrate how elevated levels of greenhouse gases like carbon dioxide lead to higher temperatures on the earth. They have also shown that global warming is the result of humanity's emissions of greenhouse gases.

Giorgio Parisi has discovered patterns in disordered, complex materials. Parisi's discoveries and theories have made it possible to mathematically describe and understand many disordered and complex materials and phenomena – not just in physics, but also in mathematics, biology and computer science.

Vocabulary

COMPLEX SYSTEMS Complex systems are made up of many components that interact in various ways. Complex systems can be controlled by chance, and small changes can have enormous consequences down the road.

THE GREENHOUSE EFFECT When the sun's rays strike the earth, they are converted into infrared light and radiant heat emitted from the ground. The greenhouse effect means that so-called greenhouse gases in the atmosphere – such as carbon dioxide, methane and water vapour – absorb outgoing infrared radiation and convert it into heat.

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. In what way do you think the laureates' contributions are important?
