PHYSICS PRIZE 2021

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Hidden patterns in the climate and in other complex phenomena

Nobel Prize lessons

The Nobel Prize in Physics

"to the person who made the most important discovery or invention in the field of physics"

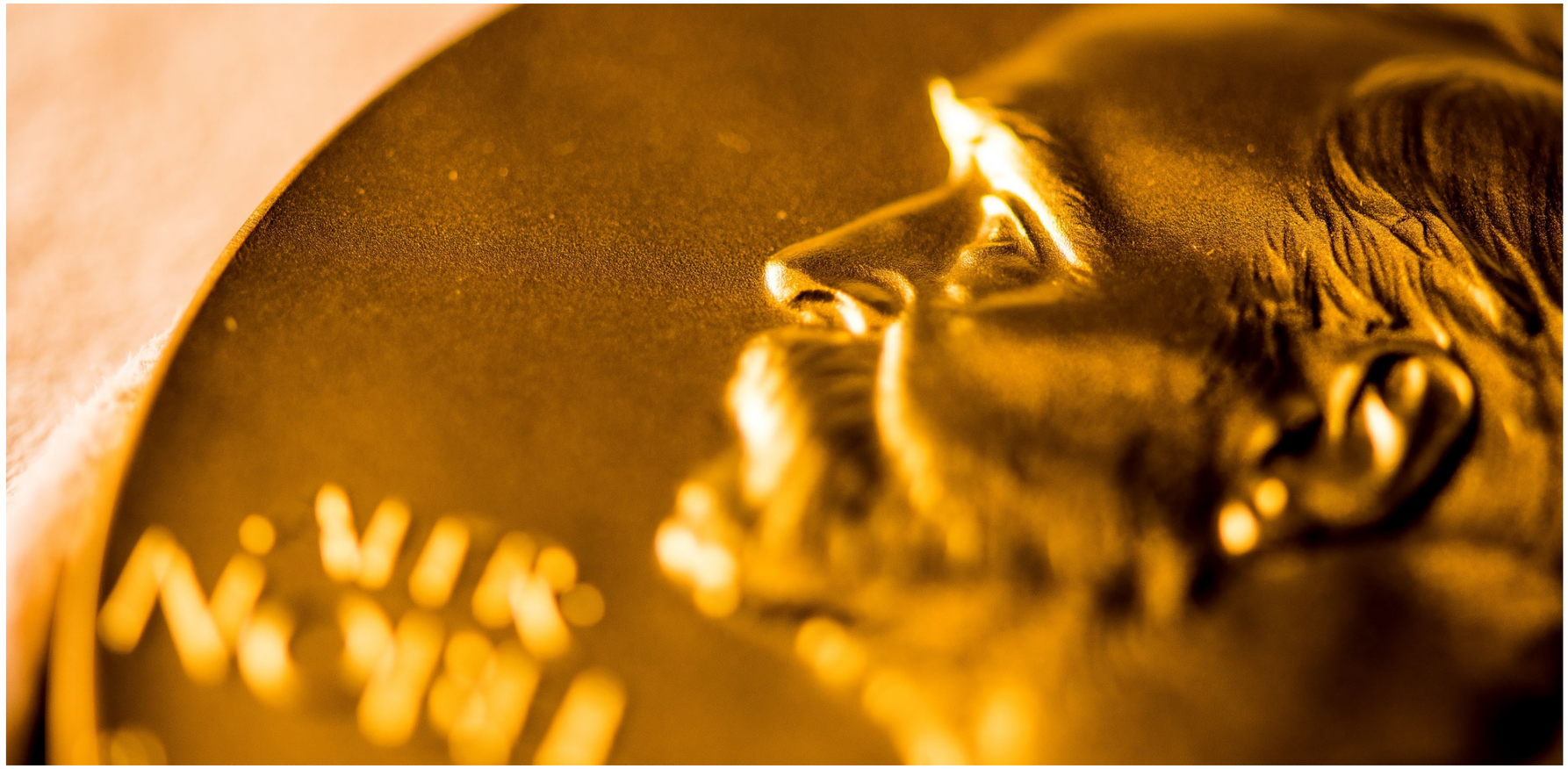


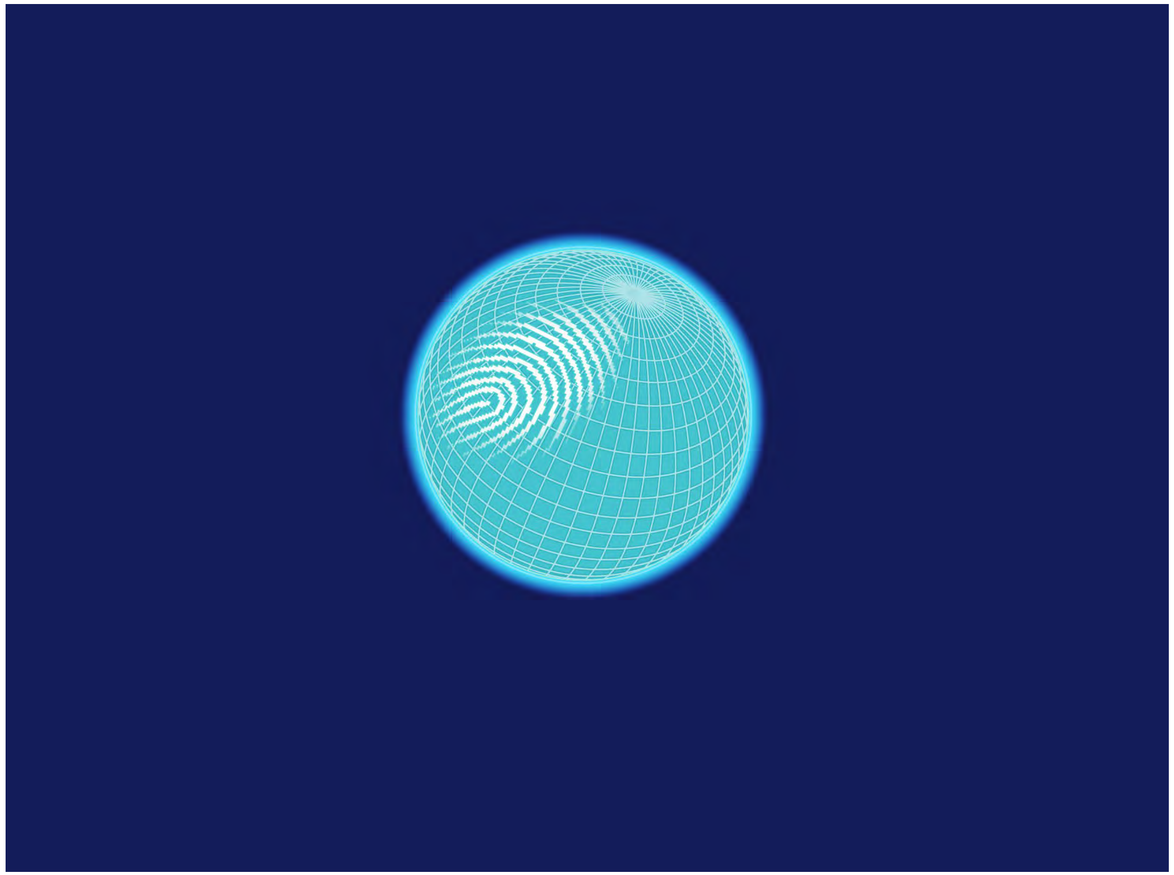
PHOTO: ALEXANDER MAHMOUD

Who is rewarded with the physics prize?

People who have made either inventions or discoveries in the field of physics.

PHOTO: ALEXANDER MAHMOUD

Physics prize 2021



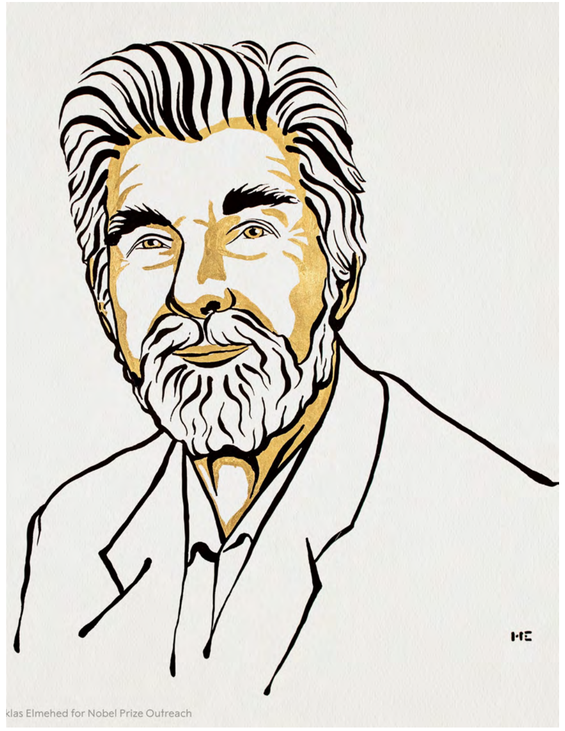
The 2021 physics prize is awarded for models of the climate and other complex systems.

The 2021 physics laureates "*for groundbreaking contributions to our understanding of complex physical systems*"

Syukuro Manabe and Klaus Hasselmann *for the physical modelling of Earth's climate, quantifying variability and reliably predicting global warming"*

Giorgio Parisi "*for the discovery of the interplay of disorder and fluctuations in physical systems from atomic to planetary scales*"

Syukuro Manabe
Born: 1931, Japan



Klaus Hasselmann
Born: 1931, Germany

Giorgio Parisi
Born: 1948, Italy

ILL. NIKLAS ELMEHED © NOBEL PRIZE OUTREACH.

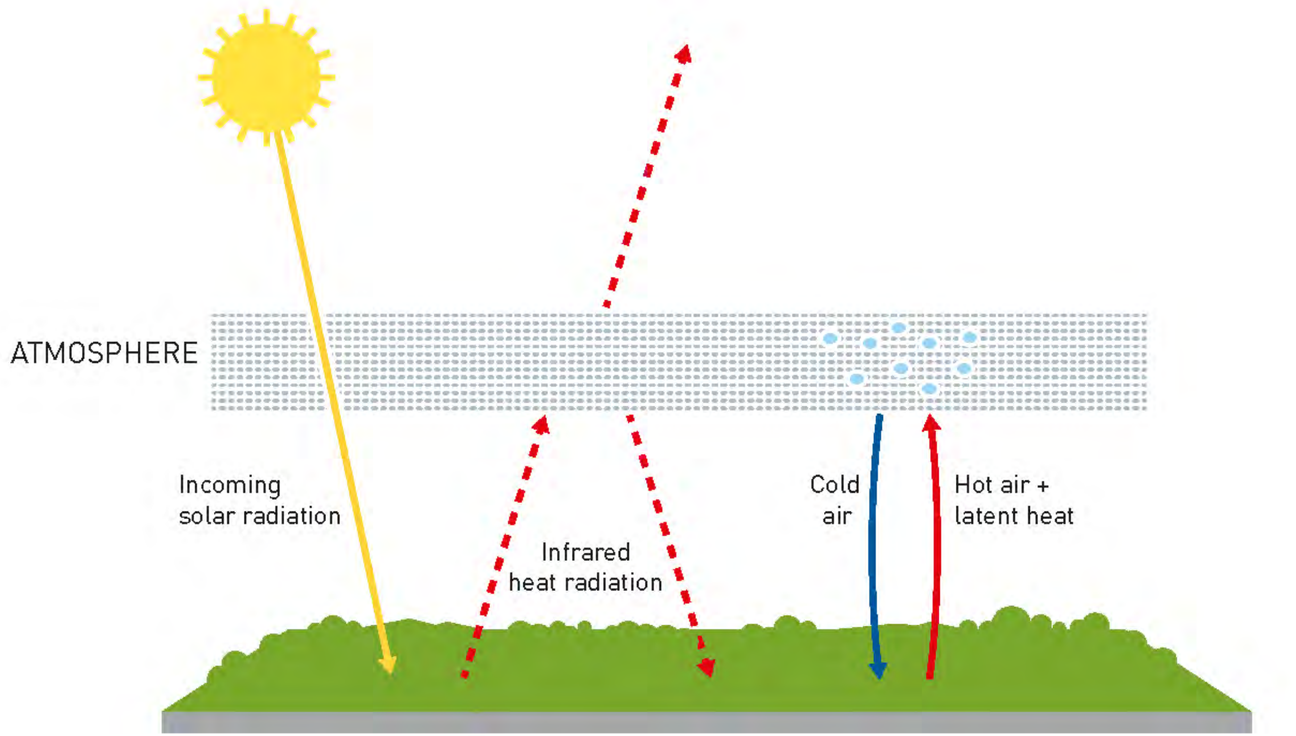
The greenhouse effect

PHOTO: ISTOCKPHOTO

The climate is a complex system in which the greenhouse effect is one important factor.

Climate models

Syukuro Manabe has developed models that demonstrate that increased levels of carbon dioxide in the atmosphere lead to higher temperatures on the earth's surface.



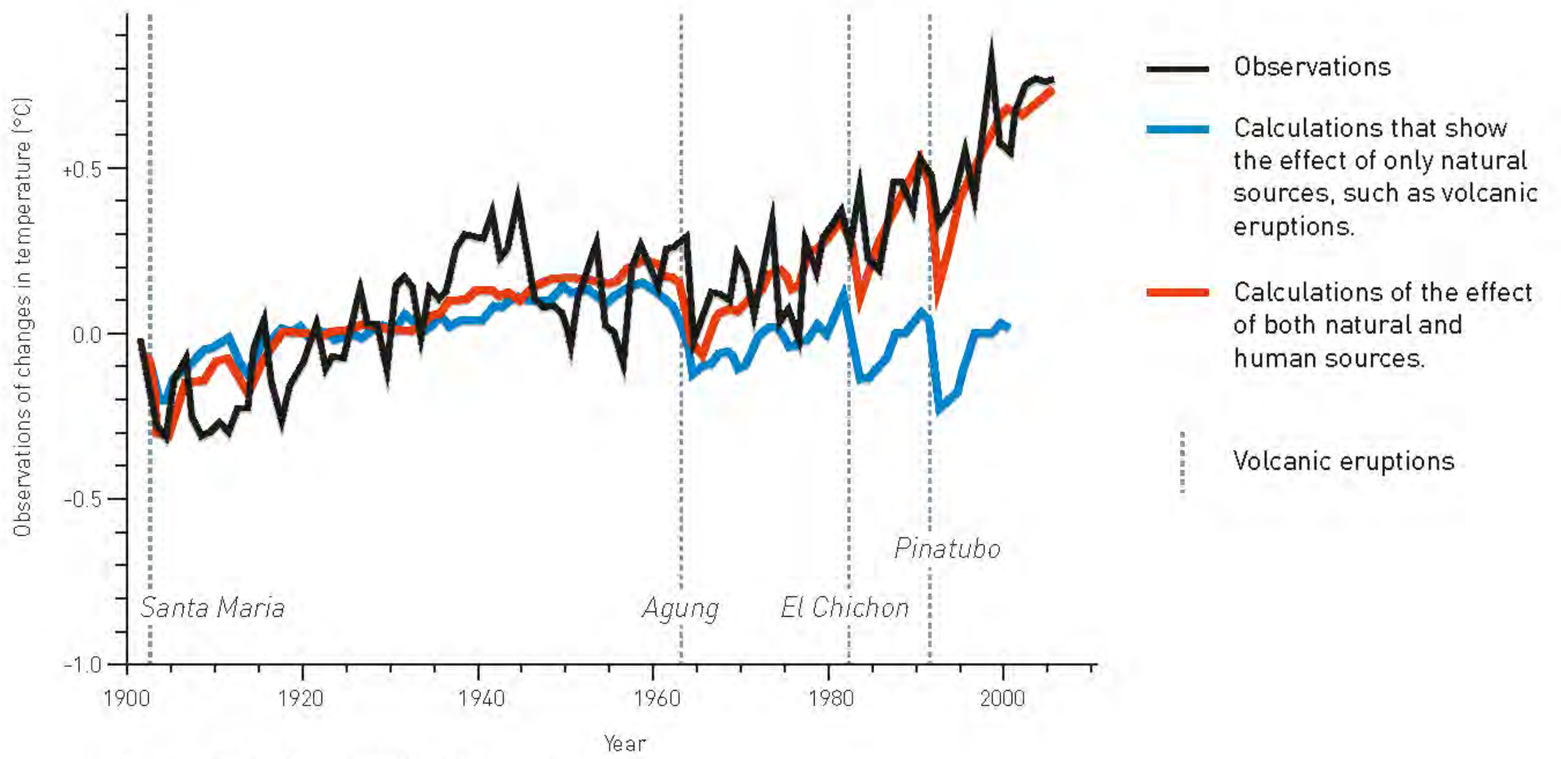
Weather and climate

PHOTO: KENNETH ALLEN

Klaus Hasselmann has demonstrated how climate can be predicted even though the weather is difficult to predict.

The climate and humanity

Klaus Hasselmann's methods have been used to demonstrate that climate change is being caused by humanity.



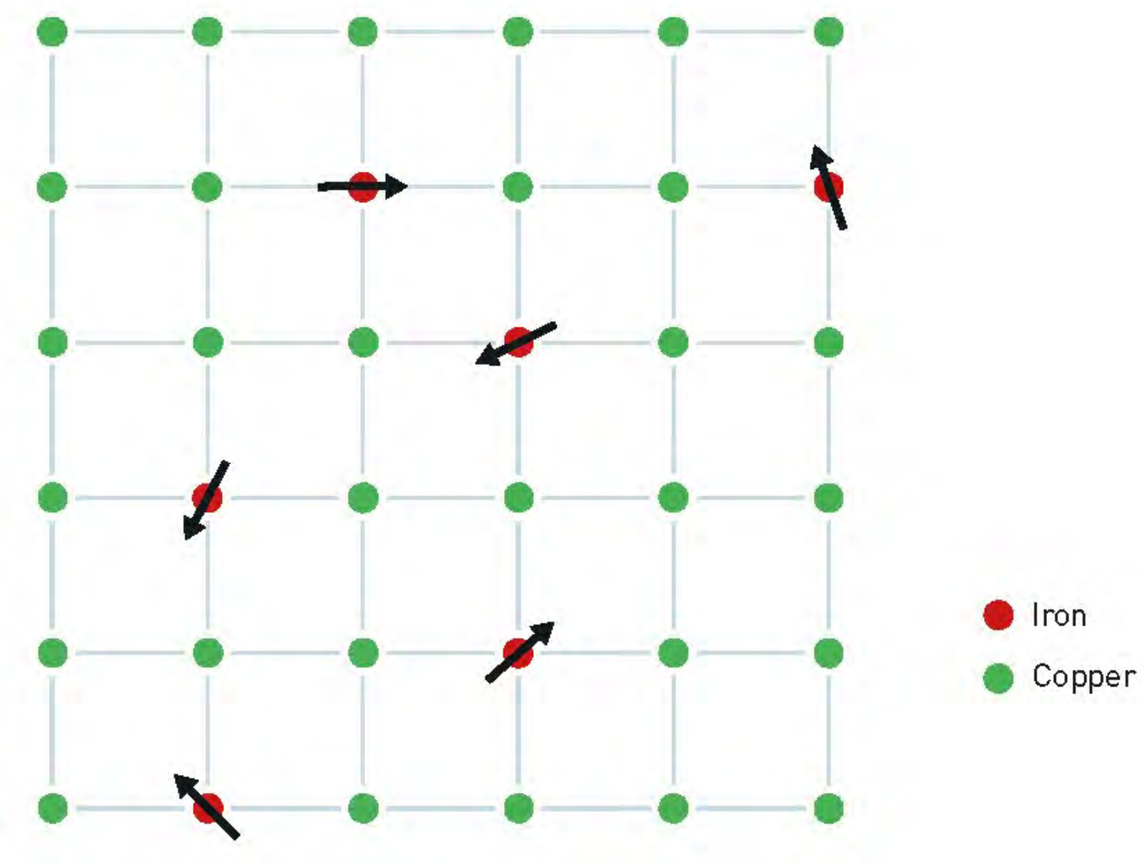
Source: Hegerl and Zweirs (2011) Use of models in detection & attribution of climate change, *WIREs Climate Change*.

Disordered and complex materials

PHOTO: WWW.ALGASPEL.SE/

Giorgio Parisi found a way to mathematically describe how irregular patterns emerge in complex systems.

Spin glass



Using a material called spin glass, Giorgio Parisi developed a theory of disordered and complex systems.

Broad applications

PHOTO:WALTER BAXTER, CREATIVE COMMONS

Giorgio Parisi’s theories can be applied to many different areas of physics, mathematics, biology, climate research and computer science.

THE
NOBEL
PRIZE

FOR THE GREATEST BENEFIT TO HUMANKIND

Nobel Prize lessons