

Five new episodes of "exzellent erklärt - Spitzenforschung für alle"

Start Time: Thursday, January 5, 2023

End Time:



57 Clusters of Excellence - one podcast: "Exzellent erklärt" reports regularly from one of the research networks that are funded as part of Germany's Excellence Strategy. All clusters of excellence share a common motivation: they address important topics of our time, work on unusual questions and conduct research for the society of tomorrow.

Five new episodes of the podcast "exzellent erklärt" were released from May to July. Listen in and follow us!

<https://exzellent-erklaert.podigee.io/>

Dark matter: In search of the missing particles

Released on 31 October 2022

No one has yet provided direct proof that dark matter exists. But most physicists no longer doubt that something exists in the universe that accounts for a far greater proportion of its total mass than the visible substance. In the Cluster of Excellence "Quantum Universe", various approaches are being pursued to track down this mysterious matter.

The Cluster of Excellence "Quantum Universe" at the University of Hamburg deals with fundamental questions about the origin, development and composition of the universe: How did the universe develop shortly after the Big Bang? What is dark matter and how did it come into being? How do particle physics and gravity influence the development of the universe? How can we learn something about the early universe with the help of gravitational waves?

In answering these questions, the scientists of the Cluster of Excellence "Quantum Universe" focus on understanding mass and gravity at the fascinating interface between quantum physics and cosmology. <https://www.qu.uni-hamburg.de/>

The ocean ground: Earth's unexplored interface

Released on 15 November 2022

There are still many unanswered questions concerning the oceans and the ocean floor. Especially when we consider the effects of climate change on the oceans. Prof. Michal Kucera uses sediment samples to research fossil plankton and thus draws conclusions about its migration movements as well as the biodiversity of the past 100,000 years - also with the help of so-called "ancient DNA" (aDNA). Dr Miriam Römer sails the high seas once or twice a year to investigate so-called "cold springs" and to find out how much methane is bound to the seabed and will possibly escape as soon as the climate warms further. With their research, both are helping to explore the ocean floor as an interface - in the cluster "Ocean floor - unexplored interface of the Earth", which is based at the University of Bremen.

The Cluster aims to open a new chapter in ocean floor research and to quantify the exchange processes at this important interface and their role in the Earth system. To do this, it is necessary to - decipher which processes control the transport of biogenic particles to the ocean floor and their transformation under changing environmental conditions, - balance the transfer of carbon and other elements between the ocean floor and seawater, - understand how ecosystems on the ocean floor react to environmental changes, and - develop scenarios for a 'warmer world' from the climate archives of the ocean floor with the help of climate models. <https://www.marum.de/Ozeanboden.html>

Our Immune System - On Inflammation, Vaccination and Microplastics

Released on 01 December 2022

Prof. Dr. Gunther Hartmann explains what the innate and acquired immune system is all about and how we can use mRNA vaccines to specifically support our immune system in its defence against viruses. Prof. Elvira Mass talks about environmental and environmental influences on the immune system. For one thing, studies have shown that we all have microplastic particles in

our bodies - to what extent this harms us is what the cluster is trying to explore. She also explains how factors such as obesity in the mother are transferred to the unborn child and eventually accompany it throughout its life.

ImmunoSensation2 is a cluster of excellence at the University of Bonn. The clusters of excellence are part of the excellence strategy of the federal and state governments to strengthen top-level research at universities. The members of ImmunoSensation2 belong to the Medical Faculty of the University of Bonn, the Faculty of Mathematics and Natural Sciences and the German Centre for Neurodegenerative Diseases (DZNE) of the Helmholtz Association. ImmunoSensation2 is dedicated to researching innate immunity beyond the boundaries of classical immunology. The cluster started on 1 November 2012 and will run until the end of 2025, with the possibility of extension. <https://www.immunosensation.de/home.html>

Fuel Science Center: Fuels for the future

Released on 15 December 2022

Climate change is causing a rethink in many areas. This is also important in the area of mobility. In addition to electric cars, which are charged with regeneratively generated electricity, research is also being conducted here in the area of green hydrogen propulsion. But that's not all: "The Fuel Science Center" is exploring many different avenues and looking for ways to produce fuels without fossil components that are at the same time sustainable and also affordable and socially acceptable. A key technology here is catalysis.

The basic research of the Cluster of Excellence "Fuel Science Center - Adaptive Conversion Systems for Renewable Energy and Carbon Sources", in short FSC, creates the basis for the integrated conversion of renewable electricity with biomass-based raw materials and CO₂ into liquid energy carriers with high energy density (bio-hybrid fuels) that enable highly efficient and clean combustion. In the FSC, findings and scientific methods are being developed to replace the engine-based combustion of fossil fuels with adaptive production and drive systems based on renewable energy and alternative carbon sources under dynamic boundary conditions. <https://www.fuelcenter.rwth-aachen.de/>

Brain research - From memory to disease

Released on 01 January 2023

When we experience exciting things, our brain stores them. We have a short-term and a long-term memory. These are facts we all know about our brain. But science doesn't yet know exactly how all this works. And only when it is deciphered how we can remember things will we also understand all the dementia diseases that have to do with forgetting. The NeuroCure

Cluster of Excellence is not only concerned with memory, but also with diseases such as autoimmune encephalitis. In this disease, the body fights against itself - and thus disrupts important functions of the brain. The patients, who are often young, suffer from psychoses, hallucinations and dementia.

The focus of the Cluster of Excellence is on research into neurological and psychiatric diseases. The aim of the interdisciplinary research network is a better understanding of the disease mechanisms and the development of new therapies from the newly gained knowledge. At the centre of the activities is the promotion of networking between the scientists and their research activities. <https://neurocure.de/>