



PRESS RELEASE

No one and nothing can stop physicist Flore Kunst: A Max Planck researcher in the fast lane

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High praise for Flore Kunst. The physicist and researcher at the Max Planck Institute for the Science of Light has been awarded a coveted spot in the Max Planck Society's Lise Meitner Excellence Program 2.0, alongside two other female scientists, and is now setting up her own independent research group. At the same time, Flore Kunst has received a Starting Grant from the European Research Council (ERC) and quickly raised research funding totaling 4.5 million euros.

At the end of 2021, Flore Kunst started work on her new research area "**Non-Hermitian Topological Phenomena**" at the Max Planck Institute for the Science of Light - and barely two years later she received an invitation to establish a **Lise Meitner group**. The Lise Meitner Excellence Program 2.0 of the Max Planck Society is aimed at outstanding young female scientists. Each awardee not only receives her own independent research group, with a research budget of around three million euros for a period of six years, but also reliable career prospects through guaranteed participation in a tenure-track program. Each year, the MPG selects just three exceptionally qualified applicants from all over Germany for the Lise Meitner Excellence Program 2.0, according to the motto "Knowledge is everything". This means that Kunst can count herself among the rising stars and strongest talents in top international research. The awarding of an ERC Starting Grant of 1.5 million euros for a period of five years to Flore Kunst also underlines the enormous scientific impact of her research work: the award criteria of the **ERC Starting Grant** exclusively assess the excellence of the research project and the scientist.

The physicist will use the 4.5 million euros in funding to investigate non-Hermitian topological phenomena, expand the theoretical understanding of these systems and, in the longer term, implement these findings in concrete experiments.



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A doughnut is also a cup? Flore Kunst can prove it

Her research area "Non-Hermitian Topological Phenomena" is a budding field that is developing dynamically and gaining in importance. As a fundamental discipline of mathematics, topology is concerned with the properties of geometric objects, which are preserved under deformation. For example, from a mathematical point of view, the shape of a doughnut can easily be transformed into a cup: Both objects have exactly one hole, which means they have the same topology. Now, however, Flore Kunst is looking at the topology of systems that are not closed – non-Hermitian - and interact with their environments. In real systems this happens, for example, through the exchange of particles or energy.



Specifically, the researcher wants to go beyond closed, lossless systems, both in the single-particle and the many-particle picture. The mathematical description of these non-Hermitian topological phenomena is extremely complex. The use of non-Hermitian models is indispensable to quantum optics, and the description of open quantum systems. Such models make it much easier to describe the complexity of dissipative systems, says Flore Kunst.

The physicist has been fascinated by mathematical approaches since she was a young girl. However, it was not until she wrote her bachelor's thesis at the University of Utrecht in the Netherlands that she began to focus on physical questions, and it was not until her master's thesis "Dirac Superconductors: Superconductivity in Artificial Graphene" that Flore Kunst finally arrived in theoretical physics. After her postdoctoral phase at the Max Planck Harvard Research Center for Quantum Optics of the Max Planck Institute of Quantum Optics in Munich-Garching, she moved to the Max Planck Institute for the Science of Light in Erlangen in 2021. Initially supported by Max Planck Director Prof. Florian Marquardt, Head of the Theoretical Physics Department, the award-winning scientist is now in the process of setting up her own Lise Meitner Research Group with a generous research budget. Hard work, a good mentor and the good fortune to publish early in a new field - that's how the mother of two explains her exemplary career. She is aware of her function as a role model for young women who are enthusiastic about science. She very much welcomes the Max Planck Society's efforts to promote gender balance at the management level, from which she herself now benefits. As the newly appointed Gender Equality Officer at the MPL, she strives to address inequality and establish equal opportunities for all.

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Research at the Max Planck Institute for the Science of Light (MPL) covers a wide range of topics, including nonlinear optics, quantum optics, nanophotonics, photonic crystal fibres, optomechanics, quantum technologies, biophysics, and – in collaboration with the Max-Planck-Zentrum für Physik und Medizin – links between physics and medicine. MPL was founded in 2009 and is one of the over 80 institutes that make up the Max Planck Society, whose mission is to conduct basic research in the service of the general public in the natural sciences, life sciences, social sciences and the humanities.

