

# Möbius Strips & Music and Noise

January 2023

IOP Wolverhampton Centre's final  
talk of 2022 and first of 2023

The last lecture of last year (December 2022) and the first lecture of this year (January 2023) at the University of Wolverhampton have been delivered by two international speakers:

- Professor Alexey Kavokin, from the Westlake University in China, and a recent recipient of a Falling Walls award, spoke about the weird geometry of the Möbius strip.
- Dr Elena del Valle, from the Universidad Autónoma de Madrid in Spain and currently a Hans Fisher fellow at the Technische Universität München, spoke about Music and Noise.

## [Physics on a Möbius Strip](#)



In this December talk, the audience was introduced to the modern concept of topological physics, such as edge states, with new rules enforced in a material due to geometry, such as boundaries. For instance, Landau levels, that is circular motion due to a magnetic field causes electrons to go in one direction only at the boundary of a metal as they can form half-circles only there. On the other sides, electrons go in the other directions. This is a simple but Nobel-making breakthrough that brought a whole new way to classify matter.

“But what happens”, asks Professor Kavokin, “if one would consider a metallic Möbius strip which has, by definition, no direction, no side?”

After explaining the conundrum with paper-models that he circulated through the audience, Professor Kavokin brought us into the details of the theory he worked out to reconcile topology with logic. His predictions of what should happen remain to be confirmed experimentally.

This lecture brought our privileged audience for this day on the edge (of knowledge) and closed an interesting and varied talk series at the Wolverhampton centre for 2022.



## Music and Noise



In the 2023 opening Lecture, Dr del Valle, a theorist of quantum light, but also an enthusiastic musician and composer, explored how physics is relevant to music, connecting ideas such as Fourier transforms and the timbre of various instruments, or how different feelings can be shaken by playing the same song in different keys.

She also explored the notion of noise, central in Physics, and how one can distinguish it from, or on the opposite, merge it with, music.