Kolloquium

Theoretische Physik

Universität Konstanz

Prof. Oded Zilberberg
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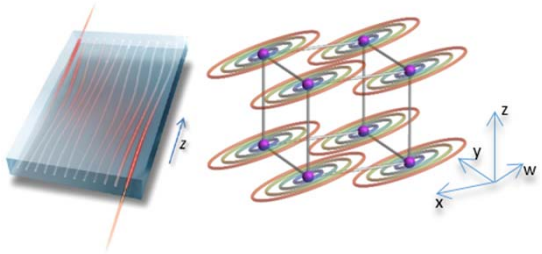

Topological pumps and synthetic dimensions

Topological phases of matter have fascinated researchers since over 30 years. Indeed, this year's Nobel prize joins the two Nobel awards for the quantum Hall effects in commending this unique field. In my talk, I will start with introducing the quantum Hall effect and demonstrate how it is related to topological pumps. Using Laughlin's argument, we shall see how a quantization of current through such electronic devices occurs. I will, then, present our realizations of topological pumps using two completely different bosonic systems, namely, using coupled photonic waveguide arrays and with trapped atoms in optical superlattices. Last, I will present how the notion of two-dimensional topological pumps naturally leads to a path for realizing the 4D quantum Hall effect in the lab using synthetic dimensions.