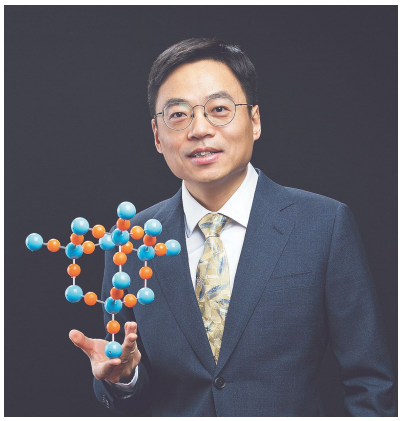
Topological laser and transparent metal

Ling Lu

Institute of Physics, Chinese Academy of Sciences, Beijing, China

I will discuss two projects in our group that interface optics with condensed-matter physics. In the first part, I will explain why the design of everyday semiconductor lasers, used in internet communications and cellphones, aligns with standard topological models in 1D. By advancing to the 2D vortex zero mode, we invent topological-cavity surface-emitting lasers (TCSELs) that significantly outperform the commercial counterparts. We also demonstrate the monopole modes in 3D, as proposed half a century ago by Jackiw and Rebbi, completing the kink-vortex-monopole trilogy. In the second part, I will discuss a new material class to potentially solve the incompatibility between electrical conductivity and optical transparency in solids.



Ling Lu is a group leader in the Institute of Physics, Chinese Academy of Sciences, Beijing China, where his group is researching topological devices and novel optical materials. He obtained his bachelor in Physics from Fudan University, and a Ph.D. in Electrical Engineering from University of Southern California. He was a postdoc at Massachusetts Institute of Technology, where he and colleagues coined “topological photonics” and discovered “Weyl points”. He was awarded the Chen Ning Yang Award by the Asian Pacific Societies, Pei Yuan Zhou Award by the Chinese Physics Society, and the Highly Cited Researchers by Clarivate Web of Science.