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Topology vs. interaction: the strong, the weak and the fragile

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Topological systems of non-interacting electrons may be forced by their topological nature to have a gapless spectrum. As two examples, Integer quantum Hall states and topological insulators must carry gapless edge states, which allow them to carry current. Whether interaction between the electrons may turn a gapless conductor into a fully gapped insulator depends on the case at hand, with a negative answer for the first example and a positive for the second.

In this talk I will review these two examples, and then discuss bands of fragile topology. I will explain what fragile topology is as well as how and when it forbids a gapped spectrum at the non-interacting level. Then, I will show that in this case interactions may be powerful enough to overcome the decree issued by topology, and explain how they do that. Finally, I will discuss relevance to twisted bi-layers of graphene.

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