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# Observing the magnetoelectric effect in classical and quantum electrodynamics.

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Whenever new states of matter are discovered, or a new energy window is opened, there is need and interest to look for new physics. Phases of matter described by topological order have attracted such attention. On the one hand they seem promising for applications such as quantum computation or spintronics and on the other they may shed some lights on axion physics, or on possible magnetic-monopole-like behaviour of certain materials, or on a novel kind of light-matter interaction. In this talk I will present some results regarding the electromagnetic response of topological insulators (TI), Weyl semimetals and chiral metamaterials in configurations that are highly sensitive to the boundary conditions. In all the cases commented, minute, yet observable magnetoelectric effects are predicted. Special attention will be paid to the case of a system comprised of a TI and a quantum dot (QD), both immersed in an external magnetic field. The quantum mechanical interaction is such that a novel topological entanglement between the states of the QD and those of the plasmons induced at the TI's surface is found.

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