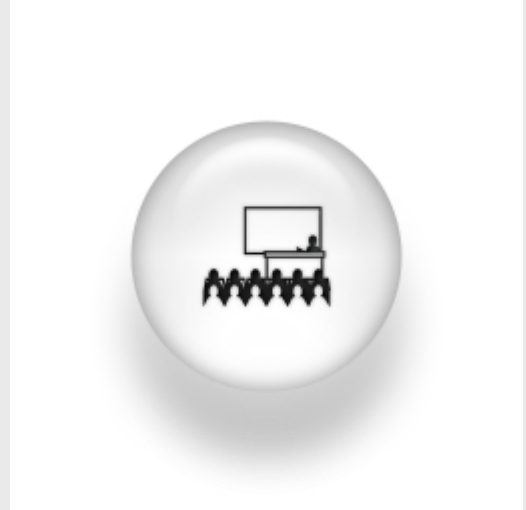


Magnetotransport in non-magnetic inhomogeneous media

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When the transport properties of a material change substantially in a magnetic field, it is often due to some kind of magnetic order. In particular, if the dielectric function is strongly magnetic-field-dependent, it is usually ascribed to coupled magnetic and elastic order, such as is found in the multiferroics. However, here I will show that magnetism is not necessary to produce either a magnetoresistance or a magnetocapacitance when the material is inhomogeneous. By considering a two-dimensional, composite medium, I find a characteristic dielectric resonance that depends on magnetic field. I propose this as a possible signature of inhomogeneities and I argue that this behavior has already been observed in materials such as nanoporous silicon.