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Strongly Anisotropic Ballistic Magnetoresistance in Compact Three-Dimensional Semiconducting Nanoarchitectures[1] CARMINE ORTIX, CHING-HAO CHANG, JEROEN VAN DEN BRINK, Institute for Theoretical Solid State Physics - IFW Dresden — In this talk, I will show that in non-magnetic semiconducting bilayer or multilayer thin film systems rolled-up into compact quasi-one-dimensional nanoarchitectures, the ballistic magnetoresistance is very anisotropic: conductances depend strongly on the direction of an externally applied magnetic field. This phenomenon originates from the curved open geometry of rolled-up nanotubes, which leads to a tunability of the number of one-dimensional magnetic subbands crossing the Fermi energy. The experimental significance of this phenomenon is illustrated by a sizable anisotropy that scales with the inverse of the number of windings, and persists up to a critical temperature that can be strongly enhanced by increasing the strength of the external magnetic field or the characteristic radius of curvature, and can reach room temperature.

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