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Application of Differential Geometry on Extraordinary Magnetoresistance ZHENZHONG XING, LEO RODRIGUEZ, SHANSHAN RODRIGUEZ, Grinnell College, SATHWIK BHARADWAJ, L. RAMDAS RAMMOHAN, Worcester Polytechnic Institute — Traditionally, the extraordinary magnetoresistance (EMR) is conducted on a circular symmetric device where a circular conductor embeds at the center of a semiconductor wafer with magnetic field on the direction of central axis, and researchers have been trying to optimize EMR with different geometry and dynamic magnetic field. It was shown that the duality between EMR and gravity theory can be used to construct a four dimensional action and compute the general field equations which provides a novel way to investigate the EMR shape optimization of different geometries and magnetic field configurations. From the general action, the specific field equations are derived in this paper for both ordinary and spherically symmetric EMR devices when tangential and perpendicular magnetic fields are applied respectively.

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