Electrodynamics and Thermodynamics of Magnetized Black Holes[1] ERNESTO ESTEBAN, University of Puerto Rico — In this work, we focus in the electrodynamics and thermodynamics of rotating charged black holes immersed in external magnetic fields. As a first application, the meaning of the magnetized Kerr-Newman metric parameters is revisited and given an alternative physical interpretation. Next, its basic properties as singularities, event horizons, and the ergosphere are obtained and discussed. As a second application, we present analytical expressions to obtain (up to a linear term in $\beta =$ BM, where B and M are the external magnetic field and spacetime mass, respectively) the electromagnetic fields, magnetic fluxes, total charge, surface gravity, and electromagnetic potentials associated to the magnetized Kerr-Newman metric. It is showed that the magnetized Kerr-Newman black hole's charge is astrophysical significant and can not be neglected as in the standard Kerr-Newman black hole. Finally, the difference in mass or energy between two magnetized black holes states differing in proper area, angular momentum, charge, and magnetic field is also discussed and compared with the corresponding results associated to the standard Kerr-Newman and magnetized Kerr black holes.

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