

Abstract Submitted
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Non-linear charge and spin Hall effect caused by insulating or charged disks in a two dimensional electron gas DAVID SCHMELTZER, HSUAN-YEH CHANG, City College of New York — We show that a time depend electric field in the presence of static vortices caused by insulating regions induces a non-linear time average Hall effect without breaking time reversal symmetry. A time dependent electric field will induce a time dependent Lorentz force in the presence of static vortices of size D giving rise to a Hall voltage in a two dimensional electronic gas. The origin of the vortices are insulating regions which cause the electronic wave function to vanish. This theory can explain the recent experiment in a two dimensional GaAs/AlGaAs dot with insulating disks. In this experiment, a driving microwave field in the y -direction has been applied and a DC voltage has been measured in the x -direction. When the insulating disks are replaced by charged disks, we suggest that the Aharonov-Casher effect will induce a spin-Hall effect.

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