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Noncommutative Magneto-Electric Responses of Topological Insulators[1] BRYAN LEUNG, Rutgers University, EMIL PRODAN, Yeshiva University — Topological magneto-electric response, constructed on a Brillouin torus, defines a Z_2 invariant and classifies topological phases. In the presence of disorder or B field, the notion of Brillouin torus is destroyed. This problem can be overcome by using noncommutative geometry. Starting from a generic 3D lattice model, we derive the magneto-electric response on a noncommutative Brillouin torus. Our result is a noncommutative topological formula. We show that its topological stability requires only mobility gap, therefore the robustness extends to strong disorder regime. Our formula doesn't involve gauge or twisted boundary condition, hence can be computational effective.

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