Quantized electric quadrupole moment in Topological Crystalline Insulators WLADIMIR A. BENALCAZAR, Department of Physics, Univ of Illinois - Urbana, B. ANDREI BERNEVIG, Department of Physics, Princeton University, TAYLOR HUGHES, Department of Physics, Univ of Illinois - Urbana — We define the quadrupole moment as a bulk topological quantity in 2-dimensional insulators. When protected by spatial symmetries, a non-trivial quadrupole with full open boundaries exhibits robust, quantized and corner-localized half-charges. Alternatively, the non-trivial quadrupole state manifests as an edge-localized non-trivial polarization (i.e. edge-localized 1-dimensional topological insulators) in systems with open boundaries along one direction but closed along the other. We characterize this phase and explore new phenomena, as well as generalizations of this moment to higher dimensions.

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