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Charged Matter Tests of Cosmic Censorship for Extremal and Nearly-Extremal Black Holes JONATHAN SORCE, Department of Physics, University of Chicago, ROBERT WALD, Enrico Fermi Institute and Department of Physics, University of Chicago — We investigate scenarios in which adding electrically charged matter to a black hole may cause it to become over-extremal, violating cosmic censorship. It has previously been shown that when the matter is localized as a point particle, no violation occurs for extremal black holes to lowest nonvanishing order in the particle's charge and mass. However, recent work has suggested that violations may be possible when the black hole deviates from extremality. We show that these potential violations always occur above lowest nonvanishing order, and conclude that no lowest-order violation can occur in the nearly-extremal case unless a violation also occurs in the extremal case. We also extend the previous results on point particles to show that no violations occur to second order in charge when an arbitrary charged matter configuration is added to an extremal Kerr black hole, provided only that the matter satisfies the null energy condition.

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