

Thermodynamic stability of extremal black holes coupled to scalar fields

We discuss thermodynamic stability of Reissner-Nördstrom (A)dS black hole in four dimensions, when it is coupled to the complex scalar field. Surprisingly, we show that it is unstable above or below some critical charge, if the scalar non-linearly couples to the black hole. This instability produces a second order phase transition near the critic point.

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