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Black holes after evaporation

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We obtain and analyse dynamical solutions of the Einstein equations in spherical symmetry sourced by a classical electromagnetic field and a quantum scalar field, the contribution of the latter being encoded by the Renormalised Stress-Energy Tensor in the Polyakov approximation. The quantum state for the scalar is constructed as an "in" vacuum resulting from gravitational collapse, and the initial data for the geometry and the electromagnetic field is that if a Reissner-Nordström black hole. We analyse the rate of depletion of the trapped region, both from Hawking evaporation of the outer apparent horizon, as well as from an outward motion of the inner horizon. We also observe that a long-lived anti-trapped region forms below the inner horizon and slowly expands outward. A black-to-white-hole transition is thus obtained from purely semiclassical dynamics.

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