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Black Mirrors: CPT-Symmetric Alternatives to Black Holes

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Einstein's equations imply that a gravitationally collapsed object forms an event horizon. But what lies on the other side of this horizon? In this talk, I am going to discuss the results of our new paper (<https://arxiv.org/abs/2412.09558>), presenting an alternative, topologically distinct solution: the Black Mirror. In the black hole solution, the horizon connects the exterior metric to an interior metric which contains a curvature singularity. In the black mirror, the horizon instead connects the exterior metric to its own CPT mirror image, yielding a solution with smooth, bounded curvature. We give the general stationary (charged, rotating) black mirror solution explicitly, and also describe the general black mirror formed by gravitational collapse. The black mirror is the relevant stationary point when the quantum path integral is equipped with suitably CPT-symmetric boundary conditions, that we propose. It appears to avoid many vexing puzzles which plague the conventional black hole.

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