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New instanton on a warped Kerr spacetime

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We find an exact time-dependent instanton solution on a vacuum Kerr-like warped spacetime in conformal dilaton gravity. The antipodal boundary condition on the hypersurface of a Klein bottle $\sim \mathbb{C}^1 \times \mathbb{C}^1$ is used to describe the Hawking particles. We used the Hopf fibration to get S^2 as the black hole horizon, where the centrix is not in a torus but in the Klein bottle. The twist fits very well with the antipodal identification of the point on the horizon. No "cut and past" is necessary, so the Hawing particles remain pure without instantaneous information transport.
A local observer passing the horizon will not notice a central singularity in suitable coordinates.
The black hole paradoxes are also revisited in our new black hole model.
A connection is made with the geomeric quantization of $\mathbb{C}^1 \times \mathbb{C}^1 \sim S^3$ by considering the symplectic 2-form.
Remarkably, the metric solution results from a first-order PDE, allowing the connection with self-duality.
The model can be easily extended to the non-vacuum situation by including a scalar field. Both the dilaton and the scalar field can be treated as quantum fields as we approach the Planck era.

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