

# A rigorous treatment of super-radiance for the Kerr black hole

Niky Kamran<sup>1</sup>

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1. Department of Mathematics and Statistics, McGill University, Montreal (Canada).

We give a rigorous treatment of superradiance for massless scalar fields in the Kerr space-time geometry of a rotating black hole in equilibrium. In particular, we prove that the Christodoulou limit for the loss of mass and angular momentum of a Kerr black hole is sharp for scalar field perturbations. The starting point of our proof [3] is an integral spectral representation for the solution of the Cauchy problem for the scalar wave equations, [1], [2]. This is joint work with Felix Finster (Regensburg), Joel Smoller (Michigan) and Shing-Tung Yau (Harvard).

## References

- [1] F. Finster, N. Kamran, J. Smoller and S.-T. Yau, 2005, An integral spectral representation of the propagator for the wave equation in Kerr geometry, *Commun. Math. Phys.*, 260, pp. 257-298.
- [2] F. Finster, N. Kamran, J. Smoller and S.-T. Yau, 2006, Decay of scalar waves in Kerr geometry, *Commun. Math. Phys.*, 264, pp. 465-503.
- [3] F. Finster, N. Kamran, J. Smoller and S.-T. Yau, 2007, A rigorous treatment of energy extraction from a rotating black hole, preprint, gr-qc 0701018.