Applying the Iyer-Wald Formalism to Cosmic Censorship

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Abstract: In this talk, I will show that the weak cosmic censorship conjecture cannot be violated in the typical Gedanken experiment of overspinning a black hole if second order perturbations of the matter source are considered. We will consider a nearly extremal charged black hole background with generic charged matter sources distributed outside the horizon, and use the Iyer-Wald formalism to investigate the perturbations to the metric up to second order. The results show that the weak cosmic censorship conjecture could be violated if we only consider the linear order perturbations, but it will be recovered at second order if the matter source satisfies the null energy condition at the horizon. In particular, our results also coincide with the third law of black hole thermodynamics, namely the temperature of black hole cannot approach zero by finite steps of physical progresses.

References

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