

Kerr–Newman Black Hole in the Formalism of Isolated Horizons

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ABSTRACT

We study the Kerr-Newman black hole in the formalism of weakly isolated horizons using a near horizon solution of Einstein's equations. General form of such solution has been found by Krishnan in 2012 [1]. His solution establishes the existence of a null tetrad which is tangent to the horizon and parallelly propagated off the horizon along a non-twisting null geodesic congruence. However, the explicit construction of such tetrad for the Kerr-Newman metric is not given in [1]. We formulate appropriate initial data and firstly construct the tetrad in a perturbative way in the neighborhood of the horizon. Finally, we find also its exact form everywhere in the Kerr-Newman spacetime.

References

- [1] B. Krishnan, *Class. Quantum Grav.* 29, 205006 (2012).