

# Massive tensor field perturbations on extremal and near-extremal static black holes

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We develop a new perturbation method to study the dynamics of massive tensor fields on extremal and near-extremal static black hole spacetimes. On such backgrounds, one can classify the components of massive tensor fields into the tensor, vector, and scalar-type components. For the tensor-type components the massive tensor field equation reduces to a single master equation, whereas the vector and scalar-type components remain coupled. We consider the near horizon expansion with a scaling parameter  $\lambda$  and expand the geometry and the field variables with respect to  $\lambda$ . By doing so, we show that at each order of  $\lambda$ , the equations for the vector and scalar-type components can reduce to a set of five mutually decoupled wave equations with source terms consisting only of the lower-order variables. With the tensor-type master equation, we obtain the set of mutually decoupled master equations that govern all dynamical degrees of freedom of the massive tensor field.

## References

- [1] K. Ueda and A. Ishibashi, *Phys. Rev. D* **97**, 124050 (2018)