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Does a detector detect soft photons?

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BMS supertranslation symmetries are related to both the gravitational memory effect and the Weinberg's soft graviton theorem; the significance of which was recently realised by Hawking, Perry and Strominger (HPS) who conjectured that applying these relations to an asymptotically flat spacetime with a black hole in the interior would imply the existence of an infinite number of soft hairs for the black hole. We explore the question whether the presence of soft photons in a system can have direct or indirect consequences in the outcome of suitably defined quantum processes involving the system. We consider an local quantum detector with dual energy levels and coupled to the background gauge invariant charged scalar field in a flat spacetime. The transition rate for such a system on an inertial trajectory, for downward transitions $E < 0$, is found to depend on the soft charges Q_e corresponding to the radial component of the electric field dressing chosen at the asymptotic boundary. The implications are discussed.

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