

Things we are still learning about uniform acceleration

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Radiation by an accelerated charge, especially a uniformly accelerated one, has been the subject of debate for almost a century. It obviously must have some connection with the Unruh-Wald radiation from an accelerated detector, and with the Moore-DeWitt radiation from an accelerated mirror, but the details of those relationships have never been entirely clear. In the early '90s, Higuchi, Matsas, and Sudarsky, and then Ren and Weinberg, studied the quantum radiation from a prescribed c-number charge by perturbation theory in both inertial and uniformly accelerated frames; they found that consistency requires that in the latter case a contribution of the Unruh thermal bath (via absorption and stimulated emission) must be included. Recently, Landulfo, Matsas, and I have reopened the investigation, using the basis of "Unruh modes" that factors the Bogolubov transformation between Minkowski and Rindler modes into a unitary transformation and a diagonal one. This analysis makes the consistency between classical radiation and quantum transition amplitudes more manifest. An important observation is that the radiation is visible as such only outside the Rindler wedge, in the sense that inside the wedge the retarded and advanced solutions coincide; this is the classical counterpart of the quantum observation that the transition probability vanishes except for Rindler zero-frequency modes, which are localized on the horizon. The final state is a coherent state whose field expectation value equals the classical retarded solution. If time permits, I will review "ancient" and modern developments concerning accelerated mirrors, accelerated detectors, and atoms falling into or supported near black holes.