Electromagnetic self-force, and decoherence owing to Unruh radiation

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The talk has two halves. In the first half I present the resolution of various long-standing problems in the physics of self-force or radiation reaction in classical electromagnetism. I derive the exact self-force of a constantly accelerating spherical shell of arbitrary size, I give a simple but rigorous derivation of the Eliezer-Landau-Lifschitz equation, and I find the self-force of an accelerating dipole, both in an inertial frame and as observed in an accelerating frame in which the dipole is at rest (the dependence of the force on orientation of the dipole was not previously fully understood). This introduces the study of more general electromagnetic phenomena in the constantly accelerating reference frame, such as Unruh radiation. The second half of the talk discusses ways in which Unruh radiation may present fundamental limits to coherence in interferometers involving massive particles, and, in principle, optical interferometers.