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Are there surprising quantum gravity effects near the horizons of large black holes?

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The following three statements cannot all be true: (i) Hawking radiation is emitted from a black hole in a pure state, (ii) the information carried by the radiation is emitted from the region near the horizon, with low energy effective field theory valid beyond some microscopic distance from the horizon, and (iii) the infalling observer encounters nothing unusual at the horizon. If black hole evaporation is unitary, as it seems to be in string theory, then the most conservative resolution may be that observers falling into a sufficiently old black hole encounter intense high energy radiation. Alternatives would seem to require either or novel dynamics that causes notable violations of semiclassical physics at macroscopic distances outside the horizon or modifications of quantum mechanics in the black hole interior.