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A simple analog of black hole information paradox in quantum Hall interfaces[1] KWOK WAI MA, KUN YANG, National High Magnetic Field Laboratory — The black hole information paradox has been hotly debated for the last few decades, without full resolution. This makes it desirable to find analogs of this paradox in simple and experimentally accessible systems, whose resolutions may shed light on this long-standing and fundamental problem. Here we identify and resolve an apparent information paradox in a quantum Hall interface between the Halperin-331 and Pfaffian states. Information carried by pseudospin degree of freedom of the Abelian 331 quasiparticles gets scrambled when they cross the interface to enter non-Abelian Pfaffian state, and becomes inaccessible to local measurements; in this sense the Pfaffian region is an analog of black hole interior while the interface plays a role similar to its horizon. We demonstrate that the lost information gets recovered once the black hole evaporates and the quasiparticles return to the 331 region, albeit in a highly entangled form. Such recovery is quantified by the Page curve of the entropy carried by these quasiparticles, which are analogs of Hawking radiation.

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