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Memory and Infrared Divergences in Quantum Gravity GAUTAM SATISHCHANDRAN, ROBERT WALD, University of Chicago — We investigate the implications of the close relationship between the memory effect and infrared divergences in quantum gravity. The memory effect implies that the “out” Hilbert space of any scattering process with nonvanishing memory is unitarily inequivalent to the “in” Hilbert space. Consequently, the memory effect implies that “out” scattering states live in an uncountably infinite set of unitarily inequivalent Hilbert spaces (one for each memory effect). It is, a priori, unclear if one can construct a Hilbert space for scattering that is (1) separable and (2) invariant under the action of the BMS group. In this talk I will present progress towards the construction of such a Hilbert space.

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