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Transient Orthogonality Catastrophe in a Time Dependent Nonequilibrium Environment MARCO SCHIRO, CNRS and CEA-Saclay, ADITI MITRA, NYU, 0 TEAM — We study the response of a highly-excited time dependent quantum many-body state to a sudden local perturbation, a sort of orthogonality catastrophe problem in a transient non-equilibrium environment. To this extent we consider, as key quantity, the overlap between time dependent wavefunctions, that we write in terms of a novel two-time correlator generalizing the standard Loschmidt Echo. We discuss its physical meaning, general properties, and its connection with experimentally measurable quantities probed through non-equilibrium Ramsey interferometry schemes. Then we present explicit calculations for a one dimensional interacting Fermi system brought out of equilibrium by a sudden change of the interaction, and perturbed by the switching on of a local static potential. We show that different scattering processes give rise to remarkably different behaviors at long times, quite opposite from the equilibrium situation. In particular, while the forward scattering contribution retains its power law structure even in the presence of a large non-equilibrium perturbation, with an exponent that is strongly affected by the transient nature of the bath, the backscattering term is a source of non-linearity which generates an exponential decay in time of the Loschmidt Echo, reminiscent of

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