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Decoherence dynamics in low-dimensional cold atoms condensates ANTON BURKOV, MIKHAIL LUKIN, EUGENE DEMLER, Harvard University — We report on a theoretical study of the dynamics of decoherence of a matter-wave interferometer, consisting of a pair of low-dimensional cold atoms condensates. We identify two distinct regimes in the time dependence of the coherence factor of the interferometer: quantum and classical. Explicit analytical results are obtained in both regimes. In particular, in two-dimensional (2D) condensates in the classical (long time) regime, we find that the dynamics of decoherence is universal, exhibiting a power-law decay with an exponent proportional to the ratio of the temperature to the Kosterlitz-Thouless temperature of a single 2D condensate. In the one-dimensional (1D) case we find a nonanalytic time dependence of decoherence,which is a consequence of the nonhydrodynamic nature of damping in 1D liquids.

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