Mesoscopic quantum superpositions in bimodal Bose-Einstein condensates: decoherence and strategies to counteract it[1] KRZYSZTOF PAWLOWSKI, Center for Theoretical Physics, Polish Academy of Sciences, Al. Lotnikow 32/46, 02-668 Warsaw, Poland, MATTEO FADEL, PHILIPP TREUTLEIN, Department of Physics, University of Basel, Klingelbergstrasse 82, CH-4056 Basel, YVAN CASTIN, ALICE SINATRA, Laboratoire Kastler Brossel, Ecole Normale Superieure, UPMC and CNRS, 24 rue Lhomond, 75231 Paris Cedex 05, France — We study theoretically the interaction-induced generation of small Schrodinger cat states from an initial phase state in bimodal Bose-Einstein condensates. We present a strategy to obtain the cats, despite severe intrinsic and experimental constraints, including particle losses and Poissonian fluctuations of the total particle number. We show that the cat fidelity can be simply deduced from the the subsequent revival. Finally, in a full multimode description, we study the effect of preexisting thermal fluctuations.

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