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Totally Destructive Interference for Permutation-Symmetric Many-Particle States

Abstract: In recent years, several distinct classes of unitary mode transformations have been discovered, for which the evolution of many non-interacting indistinguishable particles leads to an extensive suppression of final particle configurations due to totally destructive many-particle interference. In this talk, I present a general condition that unifies all these cases: For any initial Fock product state of many indistinguishable bosons or fermions, a class of unitary transformation matrices is identified for which a large number of final particle configurations vanish due to many-particle interference. We find that the suppression is only based on the wave function's permutation symmetry and, henceforth, also appears for arbitrary initial pure states. Finally, I elaborate under which conditions totally destructive interference persists in the presence of partial particle distinguishabilities.