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# On the Bosonic Phase Operator Realization for Josephson Hamiltonian Model

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Abstract: On the assumption that a Cooper pair acts as a Bose particle and based on the newly established $\langle\eta|$ representation, which is the common eigenvector of two particles' relative position and total momentum, we introduce a mesoscopic Josephson junction Hamiltonian constituted by two-mode Bose phase operator and number-difference operator. The number-difference-phase uncertainty relation can then be set up, which implies the existence of Josephson current.

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