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Phase diagram of two capacitively coupled Josephson[1] GUILLERMO RAMIREZ-SANTIAGO, Univ. de Mexico, JORGE JOSE V, Northeastern Univ. — We study the phase diagram of two capacitively coupled Josephson junction arrays with charging energy E_c, and Josephson coupling energy E_J in a perpendicular homogeneous magnetic field with frustration $F = 1/2$ and $1/3$. The results are obtained using a path integral Quantum Monte Carlo algorithm. The parameter α_i that quantifies the quantum fluctuations in the i-th array is defined by $\alpha_i = E_{ci}/E_{Ji}$. We find that thermal fluctuations are important when $\alpha \leq 1.5$ and the quantum fluctuations dominate when $\alpha > 2.0$. Vortices are the dominant excitations in the semiclassical limit, while the charge excitations are important in the quantum regime. There are also fractional charged vortices induced by the magnetic field in both arrays. We have extensively studied the interplay between the different types of vortex and charge excitations in both arrays. The phase diagrams for each array as a function of temperature, inter-layer capacitance and frustration are determined from results for the helicity modulus, Υ and the inverse dielectric constant, ϵ^{-1}. When one of the arrays is in the quantum regime and the other one in the semi-classical limit, Υ decreases with temperature, while the ϵ^{-1} increases. At low temperatures there appears to be a *novel reentrant phase transitions* in the charge degrees of freedom for $F = 1/2$.

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