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Spinor path integral Quantum Monte Carlo for fermions[1] DAEJIN SHIN, HOSAM YOUSIF, JOHN SHUMWAY, Arizona State University — We have developed a continuous-space path integral method for spin 1/2 fermions with fixed-phase approximation. The internal spin degrees of freedom of each particle is represented by four extra dimensions. This effectively maps each spinor onto two of the excited states of a four dimensional harmonic oscillator. The phases that appear in the problem can be treated within the fixed-phase approximation. This mapping preserves rotational invariance and allows us to treat spin interactions and fermionic exchange on equal footing, which may lead to new theoretical insights. The technique is illustrated for a few simple models, including a spin in a magnetic field and interacting electrons in a quantum dot in a magnetic field at finite temperature. We will discuss possible extensions of the method to molecules and solids using variational and diffusion Quantum Monte Carlo.

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