

M is for Monte Carlo: Sign-Free Studies of M-Point Moiré Materials

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I will discuss recent theoretical work exploring correlated phases in heterostructures generated by twisting individual 2D layers whose low-energy electronic dispersions lie at the Brillouin zone M-point. The resulting moiré system has low-energy electrons with a valley-filtered anisotropy, such that each valley to good approximation is only dispersive in a single direction. Remarkably, the problem is accessible via two different sign-problem-free quantum Monte Carlo algorithms along two distinct parameter axes, providing a window into the physics of strong correlations in this new family of moiré materials.