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Title: Trans-series for Hofstadter Butterfly

Abstract: Electron in a 2d square lattice immersed in a perpendicular and fractional magnetic field is known to exhibit a fractal energy spectrum known as the Hofstadter butterfly. To account for this interesting energy spectrum nonperturbative corrections to perturbative energy series must be taken into account. We reveal a surprising connection between Hofstadter butterfly and supersymmetry field theory, with the help of which, we construct the full trans-series for the energy series that includes all the non-perturbative corrections when the magnetic flux through a lattice plaquette is $2\pi/Z$.