Averaged lower bounds on tunneling in magnetic double wells

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In the absence of a magnetic field, a symmetric double-well Schrödinger operator exhibits an exponentially small but nonzero splitting between its two lowest eigenvalues in the semiclassical limit. This splitting governs quantum tunneling between the wells, whose rigorous analysis goes back to Simon and Helffer–Sjöstrand in the 1980s. Adding a strong magnetic field can eliminate tunneling altogether. We show that this is exceptional by establishing averaged lower bounds on tunneling amplitudes. A key ingredient is analytic continuation in the coupling parameter of a spatially restricted resolvent. This is joint work with Charles Fefferman and Michael Weinstein.