Quantum quenches in 2D via arrays of coupled chains

ANDREW JAMES, London Center Nanotechnology, ROBERT KONIK, Brookhaven National Laboratory — Matrix product state (MPS) methods are extremely powerful when applied to strongly correlated systems in 1D. However they are less efficacious in 2D due to the ‘area law’ growth of entanglement, limiting the system sizes that can be studied. We combine MPS methods with analytical results for integrable chains to build an algorithm that can study large (anisotropic) 2D many body quantum systems, because it reduces the need for a large ‘area’. As an example we describe the application of our method to quantum quenches of the 2+1 dimensional quantum Ising model.