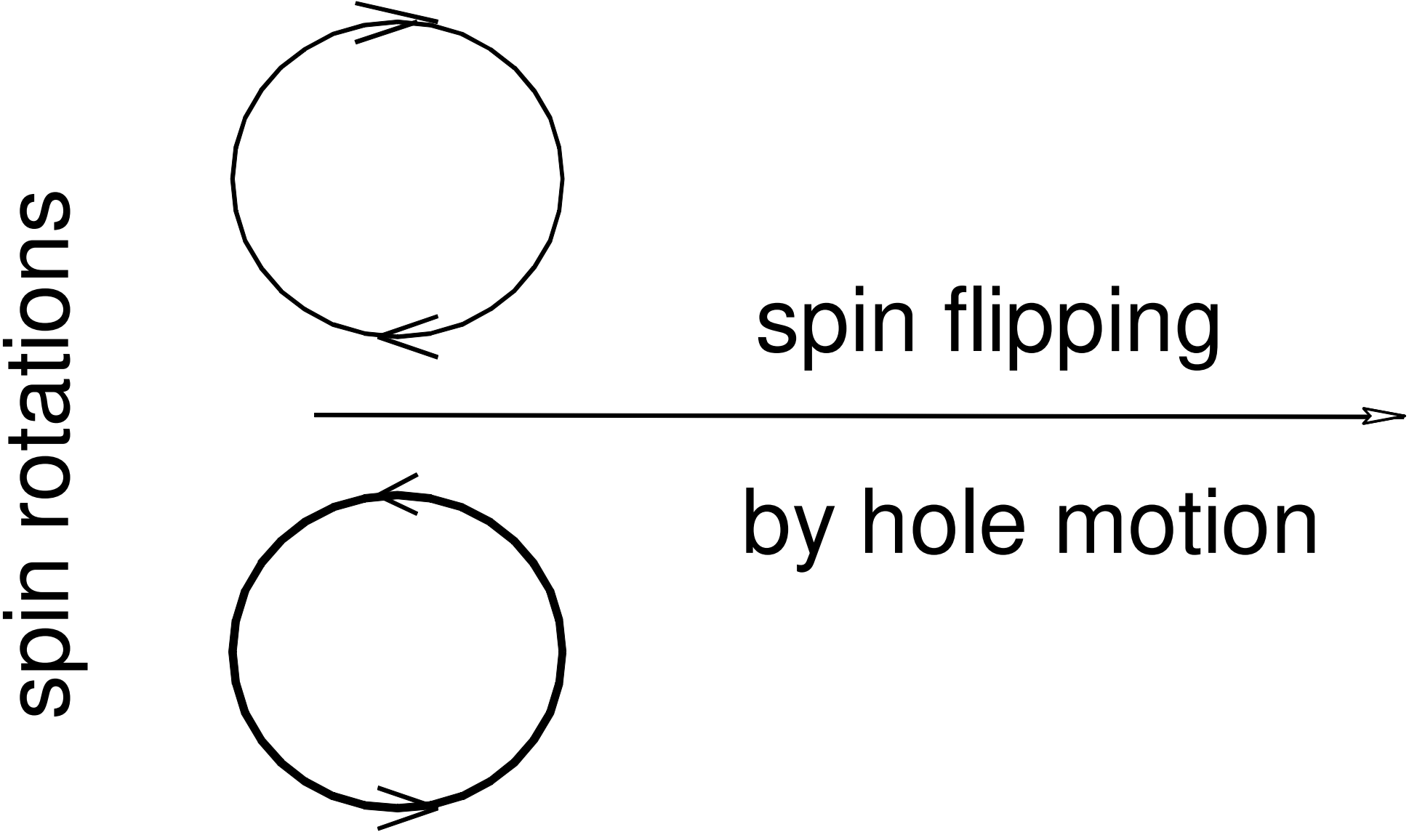
spin rotations
spin flipping
by hole motion