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A Study of Boundary Conditions in Background Field Simulations in Lattice QCD[1] SCOTT MOERSCHBACHER, Alfred University, FRANK LEE, ANDREI ALEXANDRU, The George Washington University — We investigate the effect of boundary conditions on magnetic fields in lattice QCD simulations of hadron two-point correlation functions using the background field method. This is a controlled study in which two sets of calculations are carried out with only the boundary conditions being varied - all other properties such as the magnetic field strength, pion mass, and lattice spacing are held fixed. The first set uses Dirichlet boundary conditions with the source placed in the center of the lattice, far away from the boundary in order to minimize effects from the derivative discontinuity at the boundary. The other method produces a constant field everywhere on the lattice by adding transverse links, so-called "patching" the field. This approach stresses the more physical constraint that the magnetic flux through the boundary should be continuous. We find deviations in the two correlators on the order of a few percent or less. Finally, we demonstrate this effect by calculating magnetic moments and polarizabilities of selected hadrons within both frameworks.

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