Spatial correlations of magnetic fluctuations in DC SQUIDS
STEVEN SENDELBACH, UMESHKUMAR PATEL, ROBERT MCDERMOTT,
UW-Madison Department of Physics — Recent experiments indicate that there is
a high density of unpaired spins residing on the surfaces of superconducting thin
films used to implement SQUIDs and superconducting qubits. Fluctuations of these
spins give rise to low frequency flux noise and dephasing of the qubit state. Realiza-
tion of phase and flux qubits with improved dephasing times will require a deeper
understanding of the microscopic physics that governs fluctuations of the surface
spins. Here we describe experiments to probe the spatial correlation of magnetic
fluctuators in a SQUID circuit. The SQUID loop incorporates multiple current
taps, enabling one to locally address magnetic fluctuators. Preliminary data reveal
correlated fluctuations on a length scale of order 10 μm. We discuss implications for
qubit dephasing.

Steven Sendelbach
UW-Madison Department of Physics