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Low frequency magnetic flux noise: role of surface adsorbates
PRADEEP KUMAR, MATTHEW BECK, University of Wisconsin - Madison, Madison, WI, JOHN FREELAND, Advanced Photon Source, Argonne National Lab, Argonne, IL, CLARE YU, RUQIAN WU, Department of Physics and Astronomy, University of California - Irvine, CA, ZHE WANG, Department of Physics, Fudan University, Shanghai, China, DAVID PAPPAS, National Institute of Standards and Technology, Boulder, CO, ROBERT MCDERMOTT, University of Wisconsin - Madison, Madison, WI — Excess low frequency 1/f flux noise is a major source of decoherence in superconducting quantum devices. It is generally accepted that the noise is due to surface magnetic defects, but the microscopic physics behind the noise mechanism is still unclear. Recent experiments suggest that adsorbates play a dominant role in the surface magnetism. Here, we describe X-ray absorption spectroscopy (XAS) and X-ray magnetic circular dichroism (XMCD) studies of magnetic adsorbates on the surfaces of superconducting thin films. We present the results of SQUID-based susceptibility and noise measurements that are part of an ongoing effort to reduce surface spin density and flux noise by improving the vacuum environment of the superconducting device.

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