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Time-Resolved SQUID Sensor with a Nyquist Frequency up to 25 GHz Z. CUI, Stanford Institute for Materials and Energy Sciences, Y. H. WANG, Stanford University, P. KRATZ, Stanford Institute for Materials and Energy Sciences, A. J. ROSENBERG, Stanford University, C. A. WATSON, I. SOCHNIKOV, Stanford Institute for Materials and Energy Sciences, Y.-K.-K. FUNG, G. GIBSON, IBM Watson Research Center, J. R. KIRTLEY, Stanford Institute for Materials and Energy Sciences, M. B. KETCHEN, OcteVue, K. A. MOLER, Stanford Institute for Materials and Energy Sciences — We demonstrate a time-resolved scanning Superconducting QUantum Interference Device (SQUID) sensor with an expected maximum sampling rate of 50 GHz. The time-resolved SQUID sampler is operated by a pump-probe pulse sequence and will be particularly useful in studying high-frequency magnetic devices and the transient behavior of magnetic materials. The high sampling rate is achieved through a Josephson-interferometry technique developed at IBM[1][2]. We tested our sampler with flux signals of order 10 mΦ_0 (where Φ_0 is the magnetic flux quantum), which corresponds to 25 million Bohr magnetons located 1 micron directly below the pickup loop. Operating in this regime, our sampler will have much higher sensitivity than bulk sensors like conventional SQUIDs and much larger spatial scanning range than single-spin sensors like NV centers. The SQUID sampler will thus be well-suited to characterize individual mesoscopic samples as well as bulk samples with mesoscopic features. [1]S. M. Faris, APL 36, 1005 (1980). [2]J. R. Kirtley, et al., "Advanced sensors for scanning SQUID microscopy", Superconductive Electronics Conference (ISEC 2013), invited paper F2.

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