

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Contact free transport characterization of recent REBCO films in very high magnetic field¹ JAN JAROSZYNSKI, JOHN SINCLAIR, National High Magnetic Field Laboratory, Florida State University, Tallahassee, Florida 32310, VALERIA BRACCINI, CNR-SPIN, Corso Perrone 24, I-16152 Genova, Italy, XINBO HU, National High Magnetic Field Laboratory, Florida State University, Tallahassee, Florida 32310 — Studies on pinning mechanisms in high temperature superconductors often require detailed knowledge of critical current density J_c as a function of magnetic field orientation as well as field strength and temperature. However, recent REBa₂Cu₃O_x (RE=rare earth elements) thin films can achieve remarkably high critical current density values by the incorporation of nonsuperconducting nanoparticles, that often pose problems with J_c measurements, due to extremely high Lorentz force, Joule heating etc. in the limited space of high field magnets. Here we demonstrate the angularly dependent J_c measured by means of contact-free vector magnetization measurements in a vibrating sample magnetometer equipped with both longitudinal and transverse pickup coils. The studies complement traditional transport techniques and are readily extended to conditions of fields and temperatures where the current density is very large and transport methods become difficult. Our results clearly show an evolution of pinning from strongly correlated effects seen at high temperatures to significant contributions from dense but weak pins that thermal fluctuations render ineffective at high temperatures but which become strong at lower temperatures

¹Supported by NHMFL via NSF DMR0654118.

Jan Jaroszynski
National High Magnetic Field Laboratory, Florida State University,
Tallahassee, Florida 32310

Date submitted: 28 Nov 2012

Electronic form version 1.4