Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

MgB_2 Coated Ellipsoids as an Approach to Investigate the Possible Enhancement of the Vortex Penetrating Field of SRF Cavities
TENG TAN, MATTHAEUS WOLAK, Department of Physics, Temple University, TSUYOSHI TAJIMA, Los Alamos National Lab, XIAOXING XI, Department of Physics, Temple University, LEONARDO CIVALE, Los Alamos National Lab — Superconducting rf (SRF) cavities fabricated from bulk niobium (Nb) are a key component for modern particle accelerators. The magnetic field distribution on the inner wall of an SRF cavity is inversely similar to the field distribution on top of a superconducting ellipsoid when we put it in a magnetic field parallel to its axis. By measuring the vortex penetration into the magnetized superconducting ellipsoids, we can deduct the behavior of SRF cavities. Magnesium diboride (MgB_2) has potential to replace Nb as it has a higher T_c of 39 K, a lower residual resistivity of $\sim$ 0.1 $\mu\Omega$ cm (at 42 K), and a higher thermodynamic critical field H_c value compared to Nb. In this work, we successfully coated uniform MgB_2 layers on top of molybdenum and niobium ellipsoids. SQUID magnetometer measurements showed that the coated MgB_2 layer has a T_c above 38.5 K, and can provide a perfect magnetic shielding up to $\sim$ 500 Oe at 1.8K. By coating MgB_2 on Nb ellipsoids, we increased the vortex penetration field (the maximum field at which a cavity can be operated) by $\sim$ 500 Oe at 2 K.

Teng Tan
Department of Physics, Temple University

Date submitted: 13 Nov 2014 Electronic form version 1.4