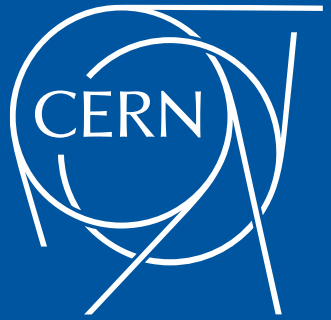


Status of experiments at SLAC and new ideas

Presenter: Jessica Golm

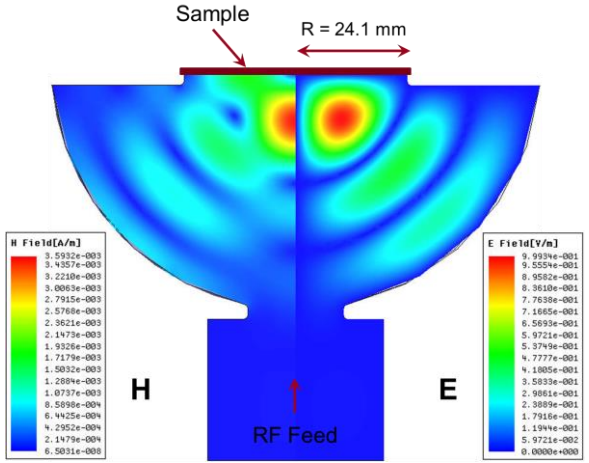
31.01.2024

HTS high power characterisation at SLAC

Motivation: HTS cavities could be used in high-power applications, for example in radio frequency systems for accelerators. They could operate at very high gradient + require a reduced number of RF power sources.

Test stand at SLAC:

- High-Q X-band hemispheric cavity with a TE_{032}-like mode at 11.4 GHz.
- Zero E-field on the sample
- Maximum H-field on the sample
- Sample accounts for ⅓ of total cavity loss
- Can achieve H_{peak} of about 360 mT using 50 MW XL-4 Klystron.



HTS high power characterisation at SLAC

Samples tested:

- Copper disk with HTS tape
- Copper disk with HTS coating

	(a) HTS tape	(b) HTS coating
Improvement of sample compared to Cu disc @ 4 K	100	280
Improvement of sample compared to Cu disc @ 80 K	19	29

REBCO SAMPLE TESTING FOR A HTS HIGH Q CAVITY

M. E. Schneider*, G. P. Le Sage, A. Dhar, E. A. Nanni,
SLAC National Accelerator Laboratory, Menlo Park,California,USA
J. Golm, P. Krkotić, W. Wuensch, S. Calatroni, CERN, Geneva, Switzerland
J. Gutierrez , ICMAB-CSIC, Barcelona, Spain

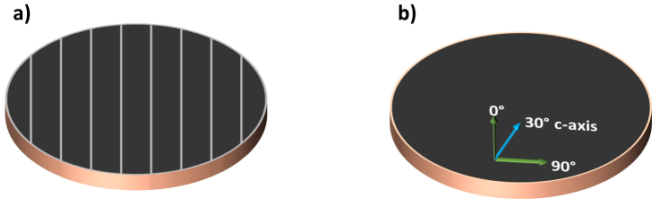
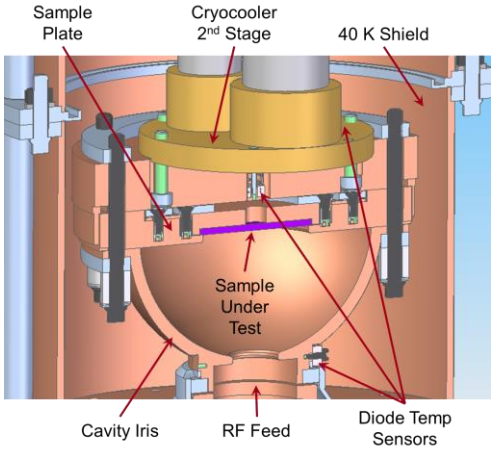
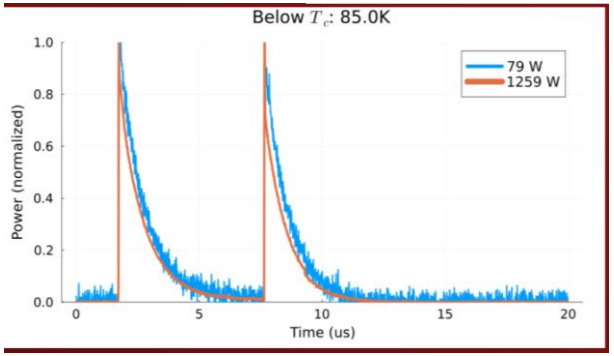


Figure 1: Sketch of the samples: a) soldered REBCO-CCs on copper and b) directly grown REBCO on MgO on copper.

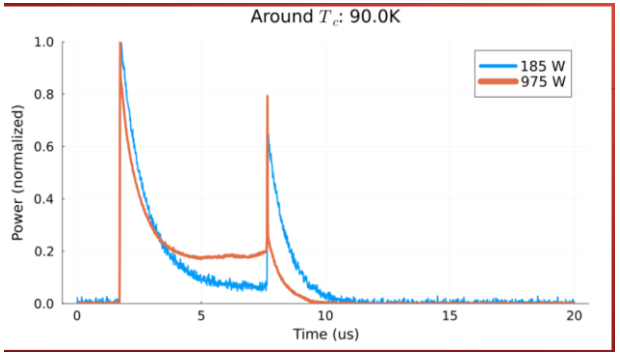


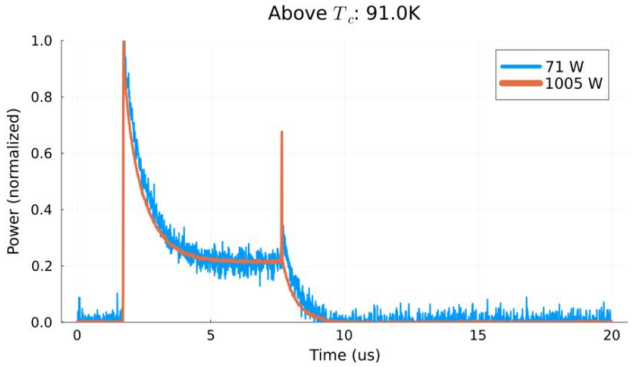
First high power tests at Tc



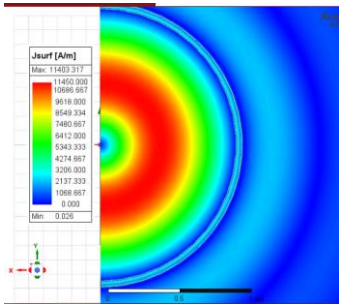
TWT is 1.6 kW @ 11.7 µs pulse
Q_{tot} is 75k
f_0=11.43 GHz
=> fill time is 13.4 µs

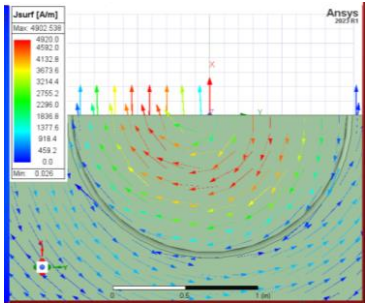
Graphs from presentation by Mitchell Schneider, Ankur Dhar, Gregory le Sage
"YBCO films in X band Hemispherical cavity at High Power" Nov 2023





Surface currents





Graphs from presentation by Mitchell Schneider, Ankur Dhar, Gregory le Sage
"YBCO films in X band Hemispherical cavity at High Power" Nov 2023

Tape sample exposed to surface currents of 10KA/m

HTS tape 12 mm

HTS tape 40 mm

HTS coating 20 mm

Problem: cutting of the surface currents

Idea: decreasing of sample size by dielectric → simulations by Pablo Martinez Reviriego

Other Ideas: Bulk HTS

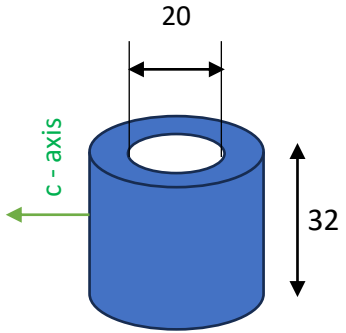
Possible supplier: ATZ / CAN Superconductors

BISCO & YBCO discs for high power testing at SLAC

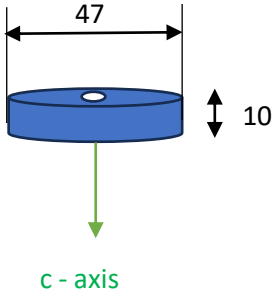
Pillbox cavity for high power test and axions haloscopes

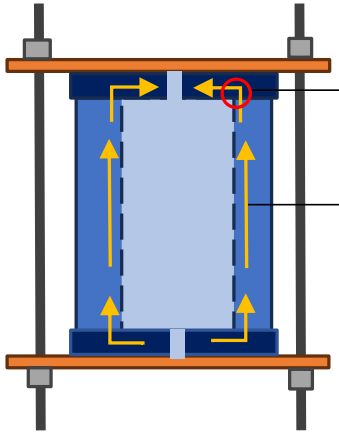
Pillbox cavity

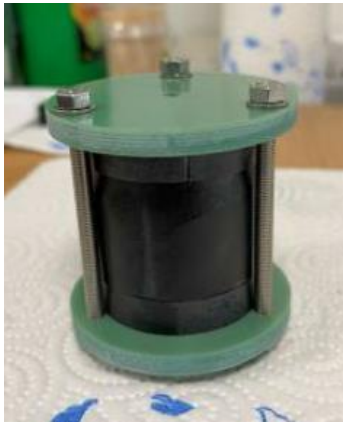
Cylinder: radial c- axis directed into the inner center of the HTS ring



Dimensions in mm







Thank you for your attention !