High density mapping systems for SRF Cavities

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Abstract

High density mapping systems for superconducting cavities are prepared. They include sX-map, XT-map and B-map. Each strip of the sX-map system has 32 X-ray sensors approximately 10 mm apart, which can be inserted under the stiffener rings to show uniform higher sensitivities. This is suitable to get X-ray distribution around iris areas, eliminating the attenuation by the stiffener ring walls.

The XT-map system enables temperature distribution mapping of cavity cells with high spatial resolution at approximately 10 mm intervals in both azimuth and latitude. It also gives X-ray distribution on cells, as well. Magnetic field distributions can be obtained by B-map system using AMR sensors. Since all these systems are based on the technology of multiplexing at cryogenic side, less number of wires can carry the huge number of signals. Among the systems, sX-map system is reported.

Connection Diagram

Only eight wires for each system.

Sensors

sX strip

XT leaf
(T-sensors & X-sensors)

Results from JLab Exp.

Ten sX-strips on LSF9 at JLab.
Some results are shown below.

Installations at JLab & KEK

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Two sX strips installed at 3-4 iris and 6-7 iris at KEK.
Series of shots are shown right.

Installations

sX on LSF9

sX at KEK

XT fits on LSF9

Summary

• sX-mapping system is tested at JLab and KEK.
• It showed high density mapping capability.
• Further tests are planned.