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New technologies for superconducting magnets in the space.

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Flying a superconducting magnet has been the dream of many experiments and projects, both for astroparticles detectors and for radiation shielding. The show stoppers have always been, among other difficulties more manageable, the cryogenics and protection. However the recent progress of the HTS (High Temperature Superconductors) have opened a new way. In particular, REBCO (Rear Earth Barium Copper Oxide) superconductor operating at 20 K in last years has become a real product available from various companies, with critical current exceeding the one of Nb-Ti or Nb3Sn , not to mention MgB2 that is confined to the low field (< 3 T) domain. In addition the new technologies of coil protection based on the surprising concept of non-insulated (NI) winding are now explored in a number of applications, including fusion, and they seem suitable to a steady state detector magnet. The talk will review the result of the NI race track coil, based on a REBCO NI winding, recently manufactured and successfully tested in a collaboration CERN-ASI-INFN. Its nearly 10 T peak field is the highest field reached in EU with REBCO coils in a non-solenoidal geometry.

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