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HTS undulators: status and test results of prototype coils for compact FELs

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Compact free electron lasers (FELs) require short period, high-field undulators in combination with shorter accelerator structures to produce coherent light up-to X-rays. Likewise, for the production of low emittance positron beams for future linear and circular lepton colliders, like CLIC or FCC-ee, high-field damping wigglers are required. Using high-temperature superconductors (HTS) in form of coated REBCO tape conductor allows for reaching higher magnetic fields and larger operating margins as compared to low-temperature superconductors, like Nb-Ti or Nb3Sn. This contribution discusses the development work done on two superconducting undulator geometries (vertical racetrack and helical) with a period length of 13 mm, as well as the status of the prototype coils. Measurement results from powering tests in LN2 of multiple vertical racetrack coils are presented, compared and discussed.

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