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Development of a cryogen free MgB₂ high temperature superconducting undulator

Thursday, 23 May 2024 16:00 (2 hours)

RadiaBeam is designing and manufacturing a 15-mm period, 1.15 T field superconducting undulator. Realizing these parameters require a small gap, on the order of 5 mm. This small gap imparts a thermal management challenge due to heating from resistive walls, wakefields, upstream dipoles, and particle losses which is challenging to overcome with NbTi or NbSn₃ wires without the use of liquid helium. Further, to reduce operating costs and reliance on liquid helium infrastructure, this undulator is designed to run off cryocoolers. In order to provide sufficient thermal overhead for cryocooling capacities, we will utilize Magnesium Diboride (MgB₂), a metallic superconductor with a transition temperature at around 39 K. Thermo-mechanical engineering design studies and production plans of our prototype will be presented.

Footnotes

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North America

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