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## **Wed-Af-Po3.16-06 [24]: Numerical Design Optimisation of Short-Period HTS Staggered Array Undulators**

*Wednesday 25 September 2019 14:00 (2 hours)*

Short period undulators are an essential component of compact free electron lasers (FEL) and medium energy storage rings for the production of hard X-rays. The use of ReBCO high temperature superconductors (HTS) in a staggered array undulator geometry is expected to yield a magnetic undulator field above 2T for a 10mm period and a 4mm magnetic gap, thus substantially increasing the performance of existing devices. The optimisation of this design with FEM simulations and a critical analysis of its working principles are discussed. Specifically, the maximisation of the undulator field and the minimisation of the HTS material are the two main objectives of this study, which is performed with realistic material parameters - measured when applicable - of commercially available bulks and tapes. Finally, merits and drawbacks of different technical solutions and HTS materials are discussed and the intrinsic limits of this undulator geometry are highlighted.

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