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Study of a Superconducting Transverse Gradient Undulator for a Laser Plasma Accelerator-Driven FEL

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The application of Laser Wakefield Accelerators (LWFA) is a potential key for realizing extremely compact Free Electron Lasers (FEL) due to an unprecedented high longitudinal electric field inside the laser-driven plasma wave. LWFA-based electron beams exhibit challenging initial conditions in terms of beam divergence and large energy spread. The superconducting transverse gradient undulator (TGU) scheme is a viable option to compensate the challenging properties of the LWFA electron beam to enable FEL amplification. A first test of the TGU was performed in a specially designed cryostat of KIT at liquid helium temperature (4.2 K). The first TGU cooling process to 4.2 K was successful. A preliminary magnet powering test was performed by using one of the two undulator coil. The results of these tests are presented in this contribution.

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