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Mechanical design studies of the pulsed solenoid for positron sources

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We give a status report of prototyping a pulsed solenoid as an optic matching device for the undulator-based positron source of the ILC. In light of studies [1] and [2], we explore various design possibilities for the pulse solenoid coil. It is proposed to rotate the coil turns at an angle equal to the flare angle of the solenoid cone, which should improve the magnetic "looseness" of the coil [3] and reduce the dissipation of magnetic flux through the inter-turn spiral gap.
Additionally, two alternative methods for securing the solenoid turns are considered. The first involves independently fixing each adjacent turn to the next, rather than using a single element to secure all turns simultaneously. The second method employs an external ceramic shell to hold the turns in place.
[1] R&D for Positron Sources at High-Energy Lepton Colliders \\ Gudrid Moortgat-Pick, Sabine Riemann, Peter Sievers, Carmen Tenholt
[2] Mechanical and thermal stress on a pulsed solenoid for positron capture at the ILC undulator-based positron source \\ C. Tenholt, G. Loisch, M. Mentink, M. Fukuda, G. Moortgat-Pick, T. Okugi, S. Riemann, P. Sievers, K. Yokoya \\ LCWS2023, SLAC, US.
[3] Some problems of high field pulsed magnets development. \\ R. Lapik, P. Martyshkin, A. Yakutin

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