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Design of Photon Mask for the Helical Undulator at ILC-250GeV

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The positron source of the International Linear Collider (ILC) is based on a superconducting helical undulator passed by the high-energy electron beam to generate photons which hit a conversion target. Since the photons are circularly polarized the resulting positron beam is longitudinally polarized. At a center-of-mass energy of 250 GeV (ILC-250), the undulator with 231 m magnet length is needed to produce the required number of positrons. The power deposition in the undulator walls should be below the acceptable limit of 1 W/m since it is a superconducting undulator and also to fulfill the vacuum requirements. The power deposition of the photon beam in undulator walls was studied and shown that the peak power deposition in the undulator walls is above 20 W/m. To keep the power deposition below the acceptable limit, 23 photon masks must be inserted in the undulator line.
In this paper the design of photon masks for an ideal and non-ideal helical undulator is presented and the power deposition in the undulator walls is discussed.

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