

Conceptual Study of an FEL Based Gamma-Gamma Collider at TESLA-500, E.L. SALDIN, E.A. SCHNEIDMILLER, YU.N. ULYANOV, ASC (Samara, Russia), M.V. YURKOV, JINR (Dubna) - This report presents conceptual project of a 2x250 GeV photon collider at TESLA. The main idea of the proposal is to use the beam of the linear collider to generate FEL radiation. At an intermediate phase of acceleration ($E = 10$ GeV) the electron beam passes the undulator of the FEL amplifier and amplifies the optical radiation of the master oscillator ($\lambda = 1053$ μm , peak power 100 MW). An output radiation of 350 GW peak power is produced at the amplifier exit. After that the electron and optical bunches are separated. The electron bunch is accelerated up to the final energy of 250 GeV and the optical bunch is transported to the conversion point via an open optical waveguide which has the form of a diaphragm focusing line and is placed in parallel with the main accelerator. At the conversion point the optical beam is focused on the electron beam and after the conversion point the gamma quanta follow the initial electron trajectory and meet at the interaction point with the other gamma-beam produced by another part of the collider. The integral luminosity of the colliding γ -beams is $L_{\gamma\gamma} = 1.5 \times 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$.