The CLIC positron sources based on Compton schemes

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The CLIC polarized positron source is based on a positron production scheme in which polarized photons are produced by a Compton process. Compton backscattering happens in a so-called “Compton ring”, where an electron beam of 1.06 GeV interacts with a powerful laser beam amplified in an optical resonator. The circularly-polarized gamma rays are sent on to a target, producing pairs of longitudinally polarized electrons and positrons. An Adiabatic Matching Device maximizes the capture of the positrons. A normal-conducting 2 GHz Linac accelerates the beam up to 2.424 GeV before injection into the Pre-Damping Ring (PDR). The nominal CLIC bunch population is 4.4x10**9 particles per bunch. Since the photon flux coming out from a "Compton ring" is not sufficient to obtain the requested charge, a stacking process is required in the PDR. Another option is to use a "Compton Energy Recovery Linac" where a quasi-continual stacking in the PDR could be achieved. A third option is to use a "Compton Linac" which would not require stacking. We describe the overall scheme as well as advantages and constraints of the three different options.