Universität Hamburg
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Undulator Simulations in CAIN for the HALHF Positron Source

Motivation

- Verify simulations regarding photon spectra
- Finding suitable parameters to maximise e^+-yield
- Optimize polarization of positron source
- Consider technical limitations

ILC Positron Source - Comparison

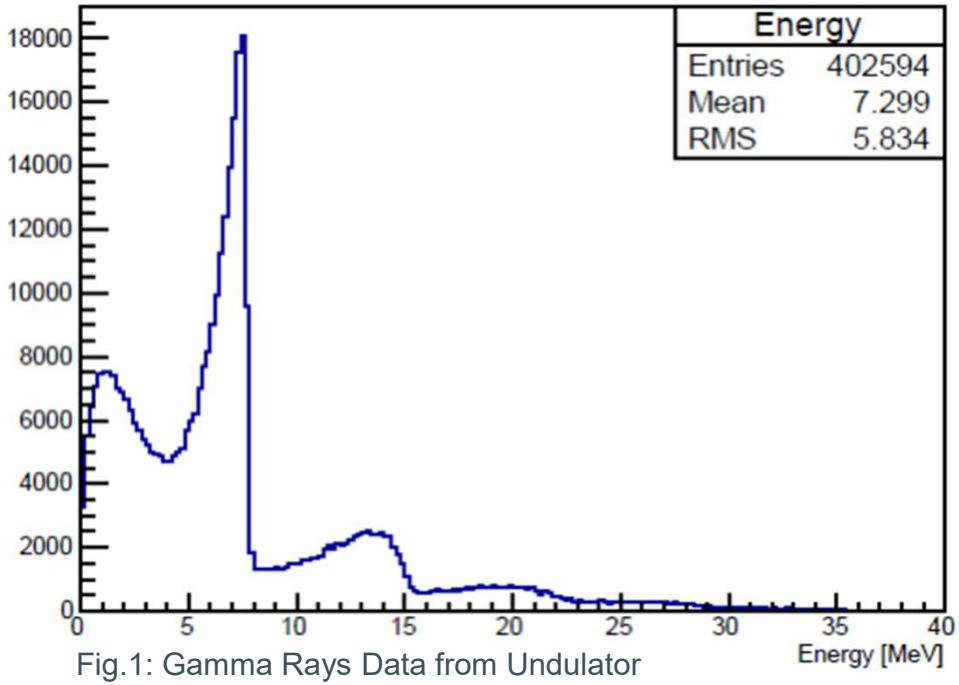

Fig.1: Gamma Rays Data from Undulator
M. Fukuda, A Study of Yield calculation for Undulator ILC positron source

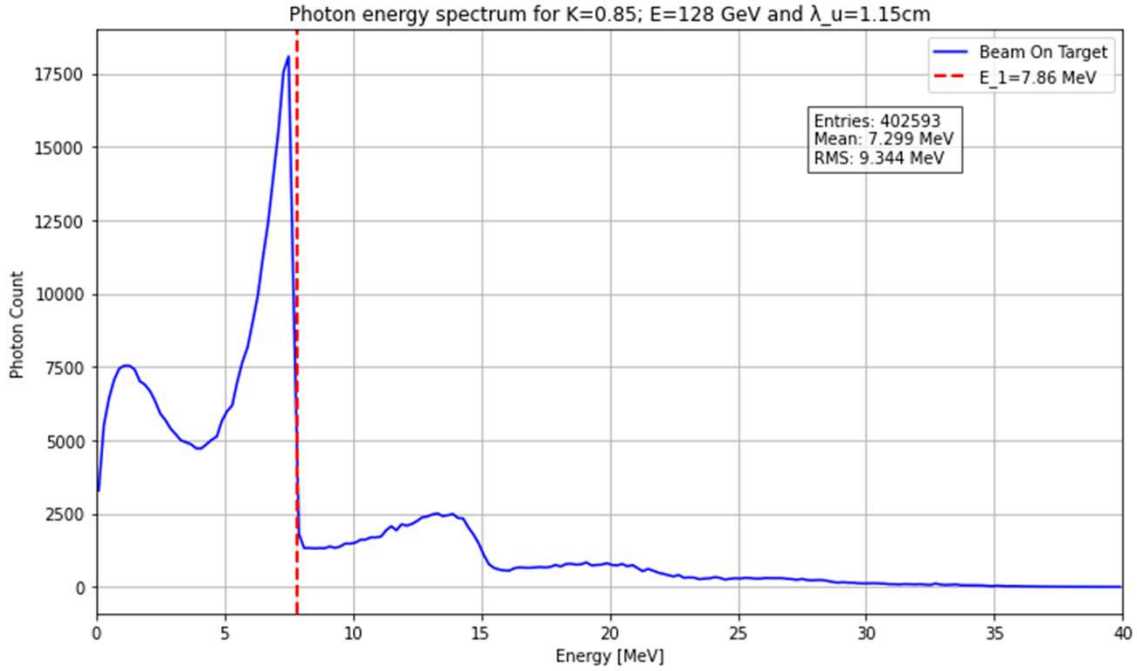

Fig 2: Photon Spectrum from CAIN

ILC-Parameters: K=0.85 E=128 GeV λ_u=1.15cm

Photon number spectrum

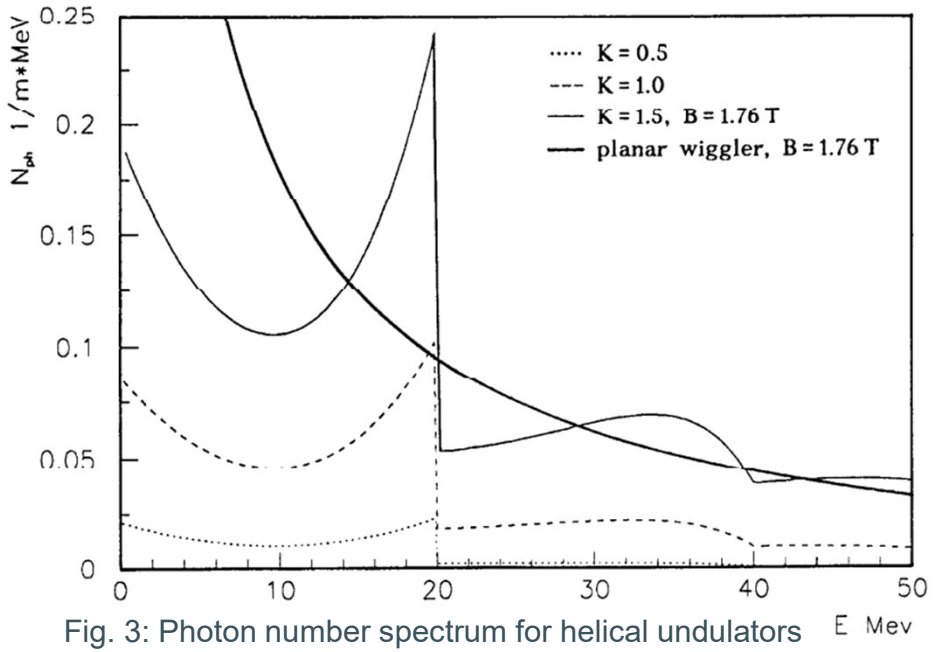

Fig. 3: Photon number spectrum for helical undulators
K. Floettmann, Investigations Toward the Development of Polarized and Unpolarized High Intesity Positron Sources für Linear Colliders

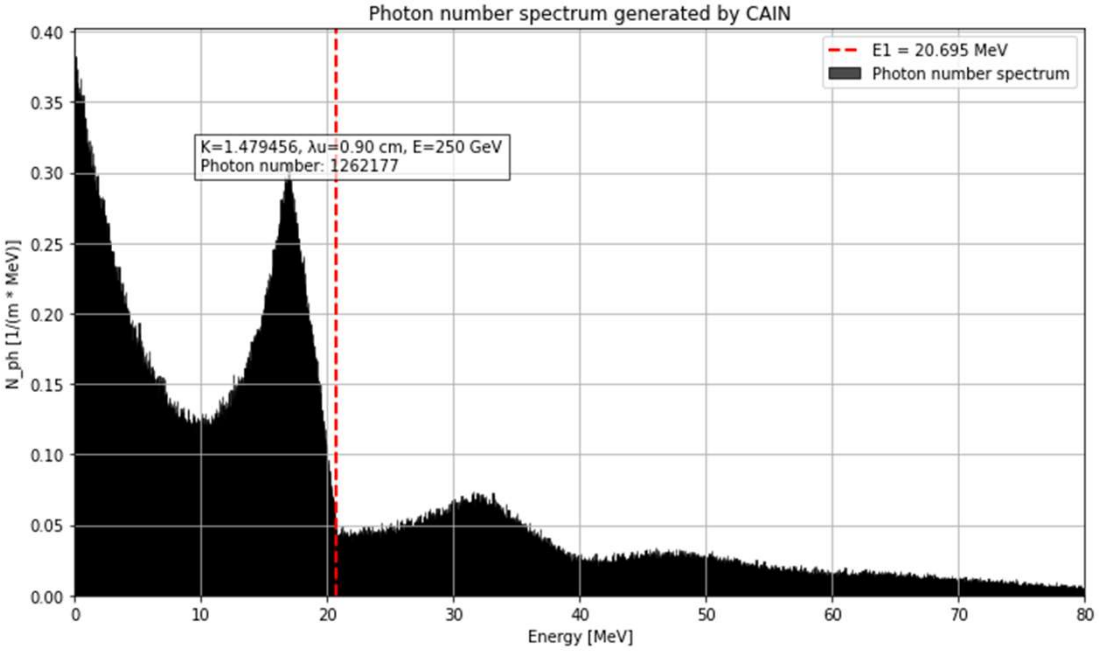

Fig. 4: Photon number spectrum by CAIN

Floettmann: K=1.5 E=250 GeV λ_u= 0.9 cm

Positron number spectrum: K=1.5 E=250 GeV λ_u= 0.9

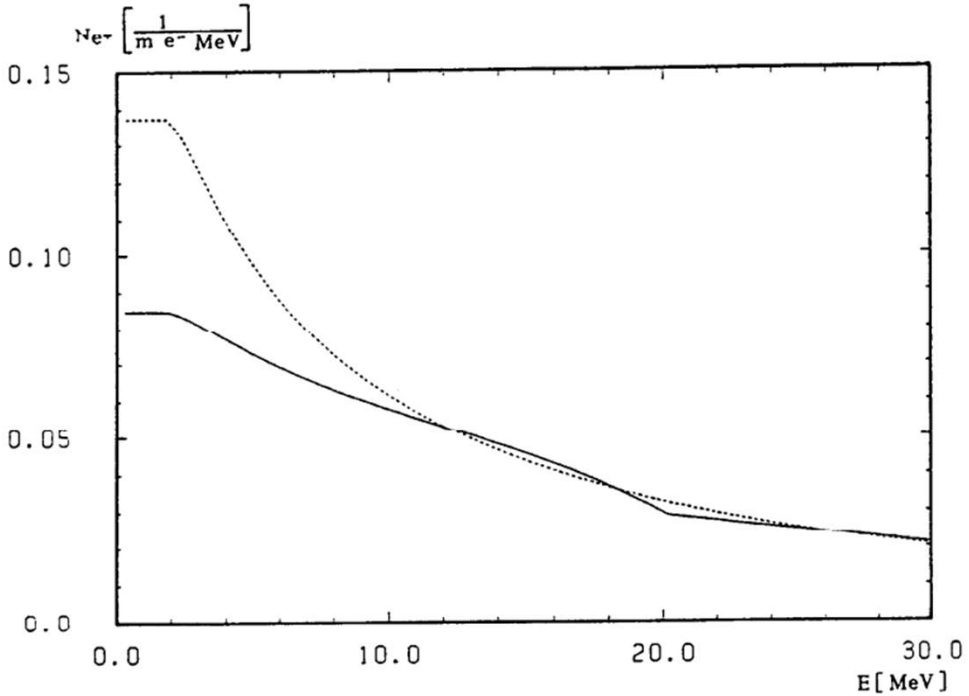

Fig. 5: Estimated positron spectrum for helical undulator
K. Floettmann, Investigations Toward the Development of Polarized and Unpolarized High Intesity Positron Sources für Linear Colliders

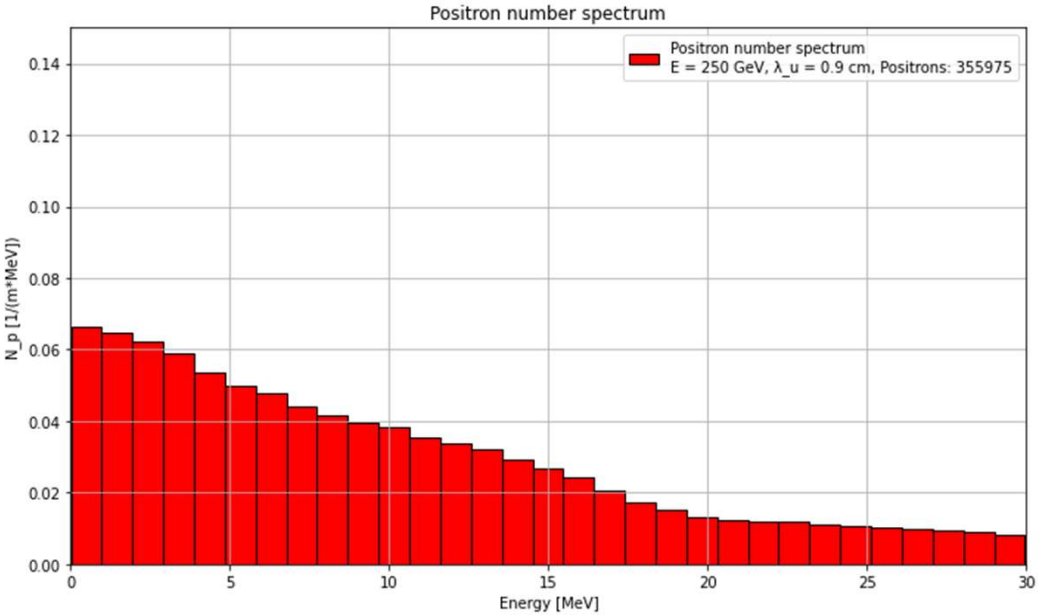

Fig. 6: Positron spectrum derived by CAIN

Estimated Photon and Positron Production

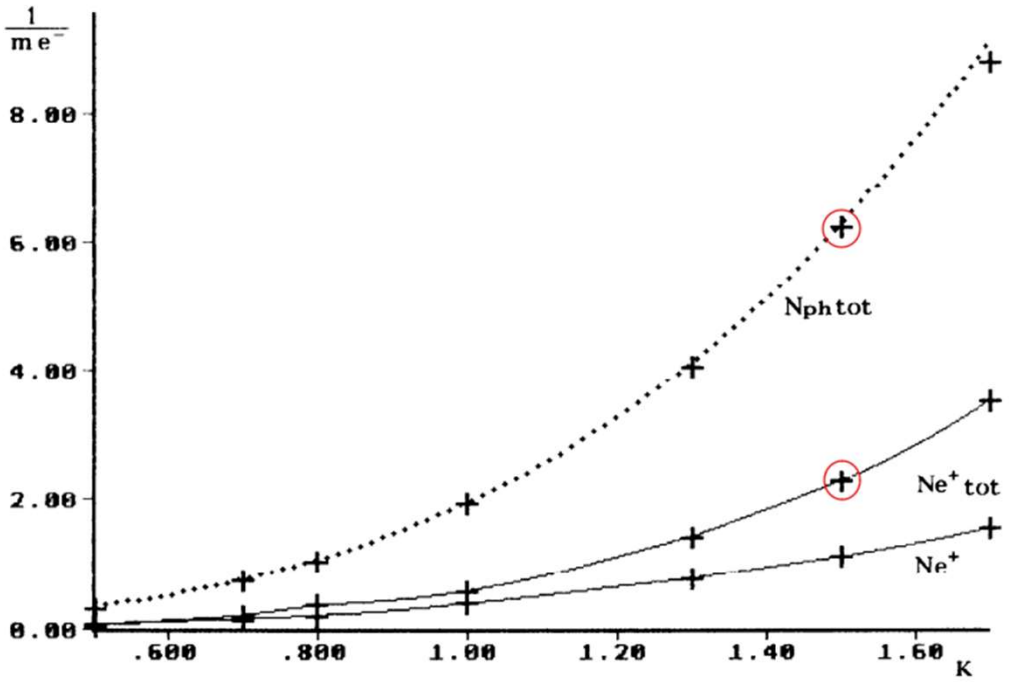

Fig.7:Dependance of photon/positron production on parameter K
K. Floettmann, Investigations Toward the Development of Polarized and Unpolarized High Intesity Positron Sources für Linear Colliders

$N_{ph\ tot}=(3.56-0.69*K)*K^2/\ \lambda_u\ [cm]$

	Photons	Positrons
Approx.	$1.43*10^6$	$4.62*10^5$
CAIN	$1.26*10^6$	$3.56*10^5$

Table 1: Estimated/CAIN-determined photon/positron production

Prospects

- Implementation of collimator in CAIN
- Running simulations with different sets of parameters
- Evaluating positron yield
- Consideration of polarization