

POSIPOL 2006  
impressions & ideas

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A. Variola

# Compton ring

yield with realistic lattice, energy spread, rf power,  
Touschek lifetime, instabilities, optical cavities near  
heat-load limit ...

(P. Gladkikh, S. Guiducci, E. Bressi, J. Urakawa...)

crab crossing (A. Variola)

compression at Compton IP (J. Urakawa)

maximum no.  $\gamma$  / e- / collision

$$P = Z_R \frac{8\pi}{3} \alpha \frac{\xi^2(0)}{\lambda} \arctan\left(\frac{l_{\text{int}}}{2Z_R}\right) \frac{\sigma}{\sigma_T}$$

$$\frac{\sigma}{\sigma_T} \approx 2.6$$

$P \sim 1$ , with  $Z_R \sim 300 \mu\text{m}$ ,  $l_{\text{int}} \sim 10 Z_R$ ,  $\lambda = 1 \mu\text{m}$ ,  $\xi^2 \sim 0.1$

# undulator & Compton $\gamma$ 's

in principle equivalent, but not quite  
(V. Strakhovenko)

photon spectrum

mean photon energy

angular photon distribution

power on conversion target

collimation efficiency

cost

# lasers

- great progress (all talks)
- fiber lasers and TB products both promising (Y. Zaouter, T. Ruchti)
- parameters close to what we need

# better integration into design

ILC:

use e- DR as Compton ring (A. Variola)

CLIC:

perhaps avoid Compton ring →

head-on collisions (V. Yakimenko),

use CLIC drive beam (T. Levefre);

laser pulse can still be stacked in optical cavity;

head-on collisions; higher-energy photons

50-100 MeV (T. Omori);

do we throw away the Compton collided part of  
drive beam?

# CLIC drive beam parameters

parameter	symbol	value
energy	$E$	1.2 GeV
emittance	$\gamma\epsilon$	150 $\mu\text{m}$
beam size @ $\beta=0.1$ m	$\sigma_{x,y}$	80 $\mu\text{m}$
bunch length	$\sigma_z$	400 $\mu\text{m}$
bunch population	$N_b$	$10^{11}$
repetition rate	$f_{rep}$	150 Hz
bunch spacing	$L_{dist}$	0.067 ns
bunches/train	$n_b$	1952

estimate  $\sim 10^7$  e+ / Compton IP; still needs  $\sim 300$  collisions / e+ bunch



# R & D

test Compton collision with CTF-3 drive beam?! (T. Lefevre)

possibility to install optical cavity from LAL??  
(F. Zomer)

test (e-) accumulation @ ATF or “ATF-3”  
(ATF/ATF-3 talks by H. Sato, K. Sakaue,  
and J. Urakawa)

# CTF-3 parameters

parameter	symbol	value
energy	$E$	200-400 MeV
emittance	$\gamma\varepsilon$	1-4 $\mu\text{m}$
beam size at $\beta=1$ m	$\sigma_{x,y}$	35-100 $\mu\text{m}$
bunch length	$\sigma_z$	300 $\mu\text{m}$
bunch population	$N_b$	6-30x10 <sup>9</sup>
repetition rate	$f_{rep}$	5 Hz
bunch spacing	$L_{dist}$	0.067-0.67 ns
bunches/pulse	$n_b$	1-2100

assuming beam is generated by rf gun