

# IPstrong, one photon pair prod (OPPP) monte-carlo

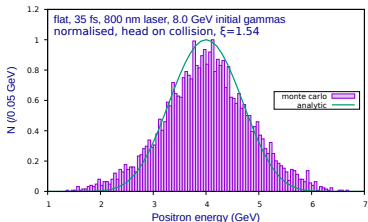
- New version of IPstrong which improves accuracy of the pair production monte carlo

$$\Gamma_{\text{OPPP}} = \frac{\alpha m^2}{2\omega_i} \sum_{s>s_0} \int_1^{v_s} \frac{dv}{v \sqrt{v(v-1)}} \dots, v = \frac{(k \cdot k_i)^2}{4k \cdot q k \cdot p}$$

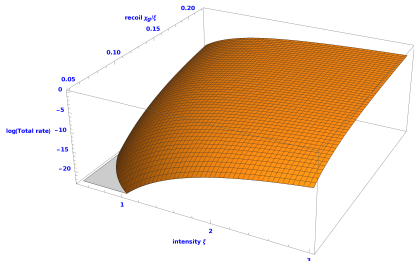
- $v=1$  corresponds to  $\epsilon_q, \epsilon_p = \omega_i/2$
- Differential rate sharply peaked at  $v=1$ . Not good for monte carlo
- So change  $\frac{dv}{v \sqrt{v(v-1)}} \rightarrow \frac{dk \cdot q}{k \cdot k_i/4}$
- **Validation:** interact flat laser pulse (with ramps) with 8 GeV gammas (HICS artificially turned off)
- **Also,** Increased gridding for OPPP total rate lookup table ( $< 1\%$  variation between looked up and true rate)
- New data runs:

[/afs/desy.de/user/h/hartin/public/IPstrong](https://afs.desy.de/user/h/hartin/public/IPstrong)

## OPPP positron spectrum



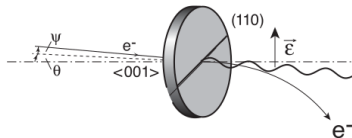
## OPPP total rate rate



# Polarized bremsstrahlung photons

- We plan to use a foil to produce high energy photons
- As well as a foil (amorphous structure), use oriented crystal (Si, Ge, Diamond)
- Energetic, linearly polarised photons produced by unpolarised electrons
- Coherent bremsstrahlung, resonance from lattice planes in phase with photon energy
- Order of magnitude enhancement of photon rate
- Crystal oriented so that electron path is 5 mrad from (001) axis and  $70\text{ }\mu\text{rad}$  from (110), 150 GeV  $e^-$  [CERN-SPSC98-17]
- 10-60% polarisation possible
- OPPP is polarisation dependent
- Schwinger field polarisation dependent?

Polarised bremsstrahlung from oriented crystal



Enhancement of bremsstrahlung

