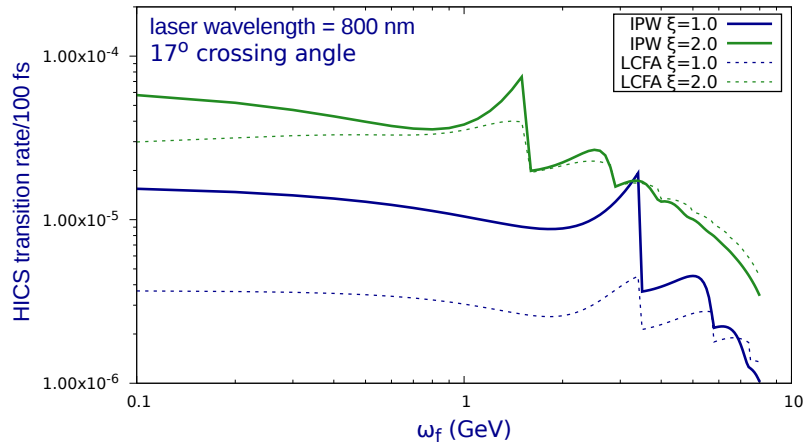
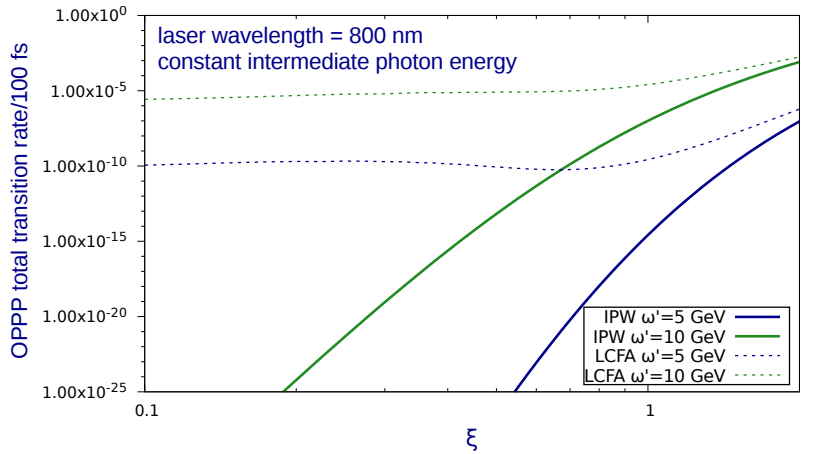
Locally constant field approximation (LCFA)

- Trident process computationally intense in circular polarised laser, **VERY** intense in linearly polarised laser
- Theory says for more intense laser, processes are formed over shorter part of the phase - **FORMATION LENGTH DECREASES**
- So oscillatory fields should start to look like constant fields (as far as the SQED process is concerned)
- Marginally ok approximation at LUXE/$\xi 2$ parameters, but certainly not below that
- Not really any substitute for accurate simulation - computing is doable (perhaps on order of week(s) for most intensive scan)

LCFA approximation in HICS



LCFA approximation in OPPP



Theory plans

TO DO

- Study effect of finite pulse length vs infinite plane wave approximation (IPW). IPW says states of definite momentum form. finite pulse means a smearing of energies
- IPstrong event generator - code up pair production monte carlo. Validate, publish and release
- Study one step Trident process for possible BSM searches
- Identify other key strong field phenomena, and strategies to discover them at LUXE

SQED workshop, theory topics

- HICS, OPPP, Trident (one step and two step)
- Beyond Volkov solution, Laser field as coherent states (allow for depletion)
- Schwinger pair production/Cosmological applications
- ALPs production, other BSM searches
- Vacuum polarisation/vacuum birefringence