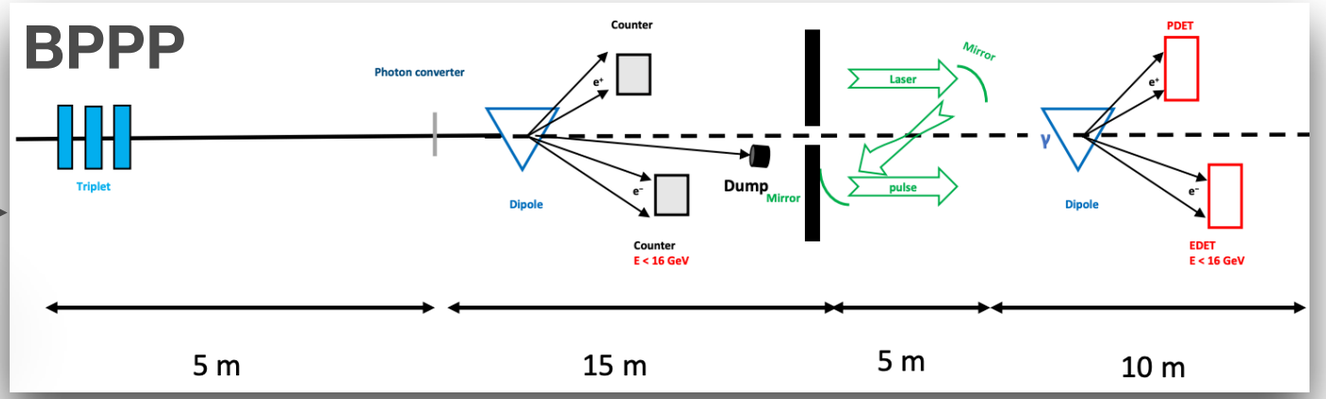
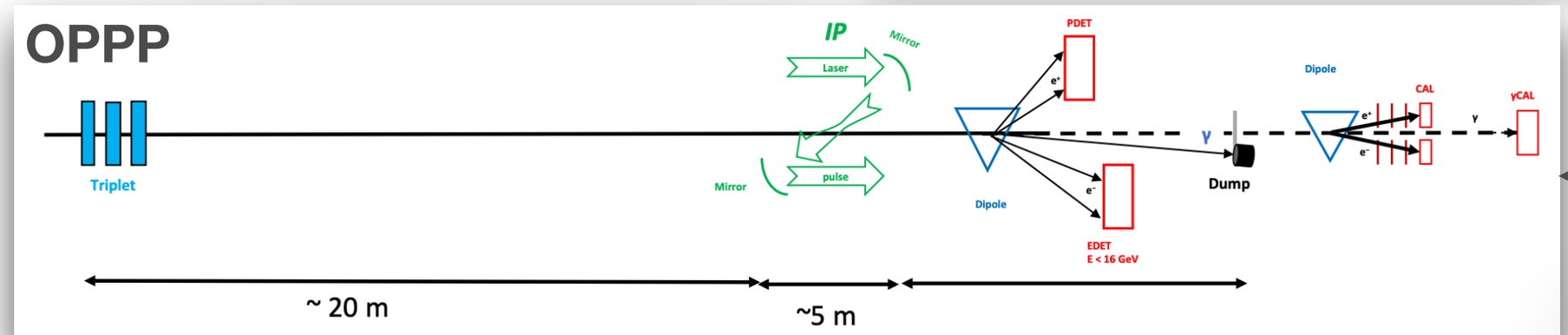
OPPP/BPPP @ LUXE

Bremsstrahlung

$\gamma_B + n\omega \rightarrow e^+e^-$





Compton

$e + n\omega \rightarrow e' + \gamma$

$\gamma + n\omega \rightarrow e^+e^-$

- XFEL electrons
  energy: 17.5 GeV, N_e per Bunch: 6×10^9, using only 1 bunch out of 2700 in the train, bunch length: 25 μm & emittance ~1.4 mrad×mm (beam-spot is $\sigma_{xyz}=5\times5\times24$ μm^3)
- Conversion target (BPPP only): Tungsten with thickness $X/X_0=1\%$, Emitted photon's energy distribution according to equation 13 in Tony's paper (also in PDG)
- Laser: Ti-Sapphire, energy: 0.35-7 J, shot duration: 35 fs, spot size: 10 μm, ω=1.55 eV (800 nm), I=0.1-2×10^{20} W/cm^2, pulse frequency: up to 10 Hz
- Collision angle (e/γ & ω): θ=π/12

Tentative plan

- November 2019: finish design and funding
- Early 2021: start of phase0 installation
- 2021-2022 / 2022-2023: phase0 data taking (~2-3 weeks/year)
- 2023/2024: phase1 installation and phase0 data analysis
- 2025-2027: phase1 data taking (~2-3 weeks/year)

Collaboration (as of March 2019):

- Germany: DESY, University of Hamburg, University of Freiburg, Helmholtz-Institut Jena, Helmholtz-Zentrum Dresden Rossendorf
- United Kingdom: University College London
- Israel: Weizmann Institute, Tel Aviv University