Polarization Transfert in Bremsstrahlung and Pair Creation

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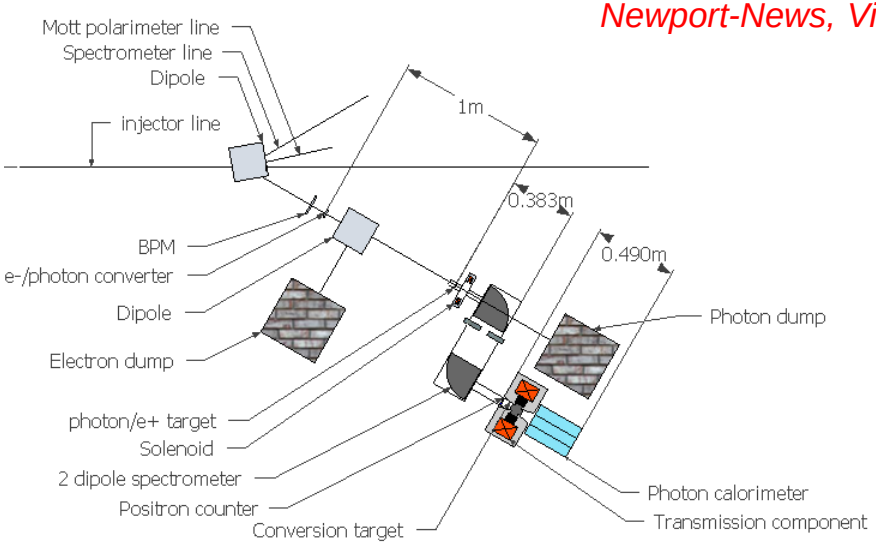
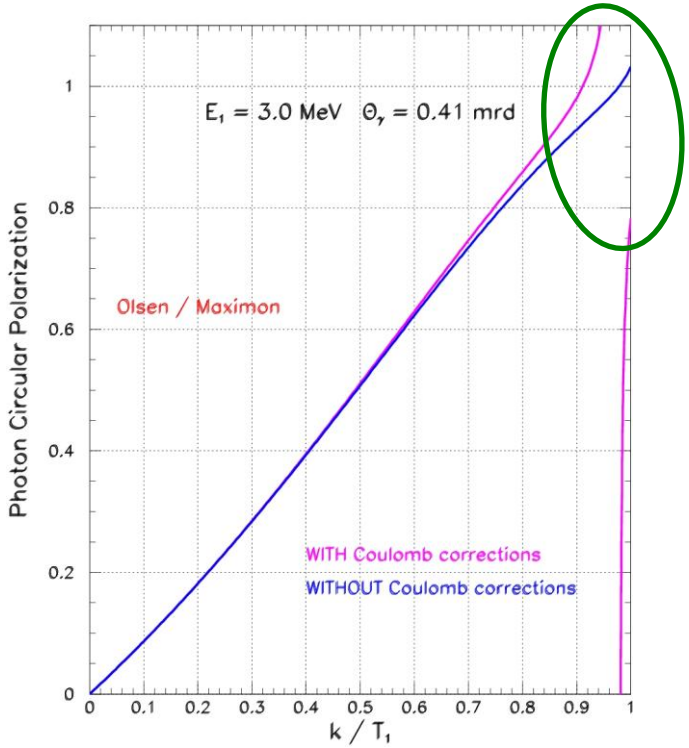


(i) Olsen & Maximon
(ii) Kuraev et al.
(iii) Physics case

Bremsstrahlung

H. Olsen, L. Maximon, PR114 (1959) 887

- The most currently used framework to evaluate polarization transferts for polarized bremsstrahlung and pair creation processes is the O&M work developped in the Born approximation for relativistic particles and small scattering angles.



- The observed **singularity** reflects the known problem of unpolarized cross sections in the **tip region**: **Coulomb corrections** appear **too strong** for heavy nuclei, leading to **negative cross sections**.

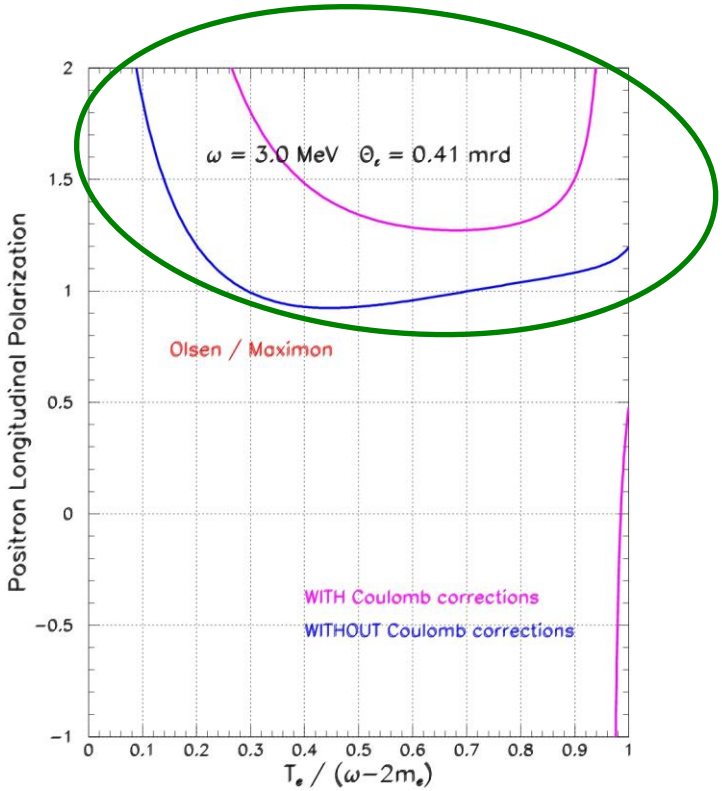
- **Unphysical polarization transferts remain** even when neglecting Coulomb corrections.

- The **full screening** case **does not** reflect any peculiar features.

Pair Creation

H. Olsen, L. Maximon, PR114 (1959) 887

- Pair creation is obtained from bremsstrahlung expressions by kinematical substitutions



- **Unphysical polarization transferts** are observed at small energy over the full kinematic range, independently of Coulomb correction effects.

- The **full screening** case **does not** reflect any peculiar features.

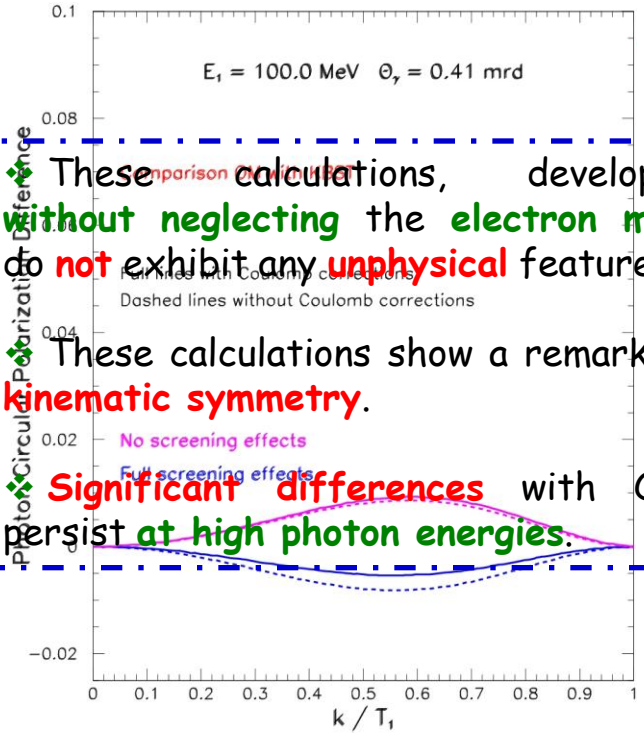
Some features of **O&M calculations** are **not valid**

Bremsstrahlung and Pair Creation

Revisited...

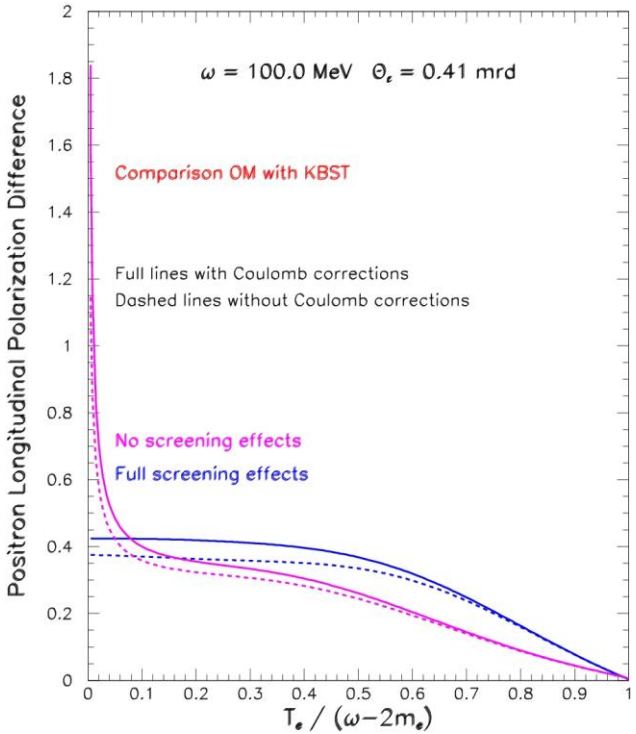
E.A. Kuraev, Y.M. Bystritskiy, M. Shatnev, E. Tomasi-Gustafsson, PRC 81 (2010) 055208

BREMSSTRAHLUNG

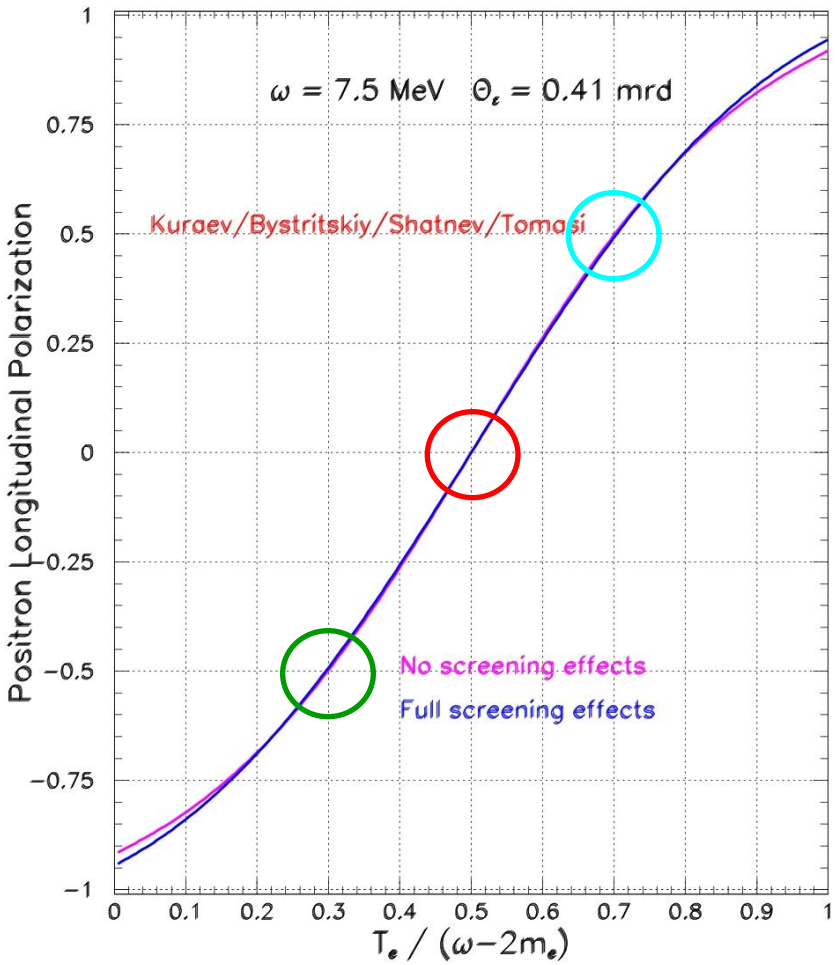


- These calculations, developped **without neglecting the electron mass**, do **not** exhibit any **unphysical** features.
- These calculations show a remarkable **kinematic symmetry**.
- **Significant differences** with O&M persist **at high photon energies**.

PAIR CREATION



PEPPo Physics



- **High energy point** with small but still sizeable differences between theoretical calculations.
- **Easiest** experimental point with significant asymmetries.

- **Medium energy point** with large differences between theoretical calculations.
- **Very difficult** experimental point because of **no asymmetry**.

- **Low energy point** with the largest differences between theoretical calculations.
- **Difficult** experimental point because of **thin target statistics**.