Polarized Positron Source using Li-lens

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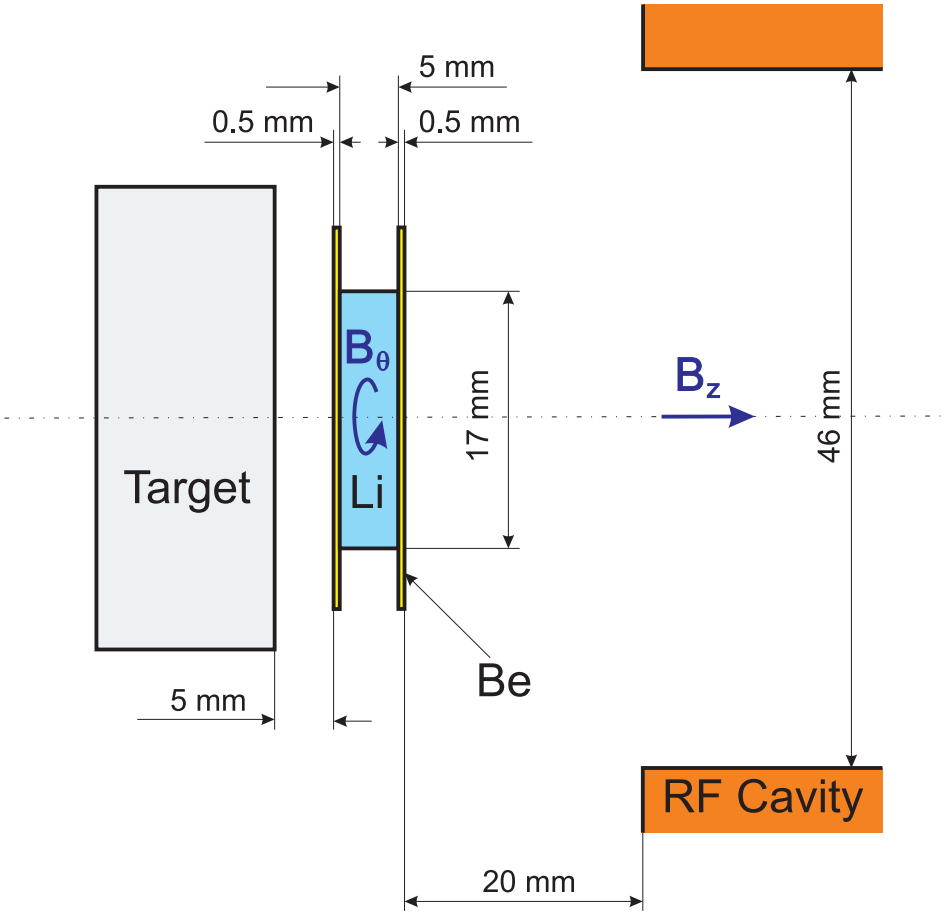
Outline

In order to estimate source activation it is necessary to know source geometry and magnetic field

- Source model with Li-lens
- Capture efficiency and e^+ polarization for
  - High and low K
  - Ti-, W-alloys target
  - 150, 250 GeV drive e^- beam
- Outlook

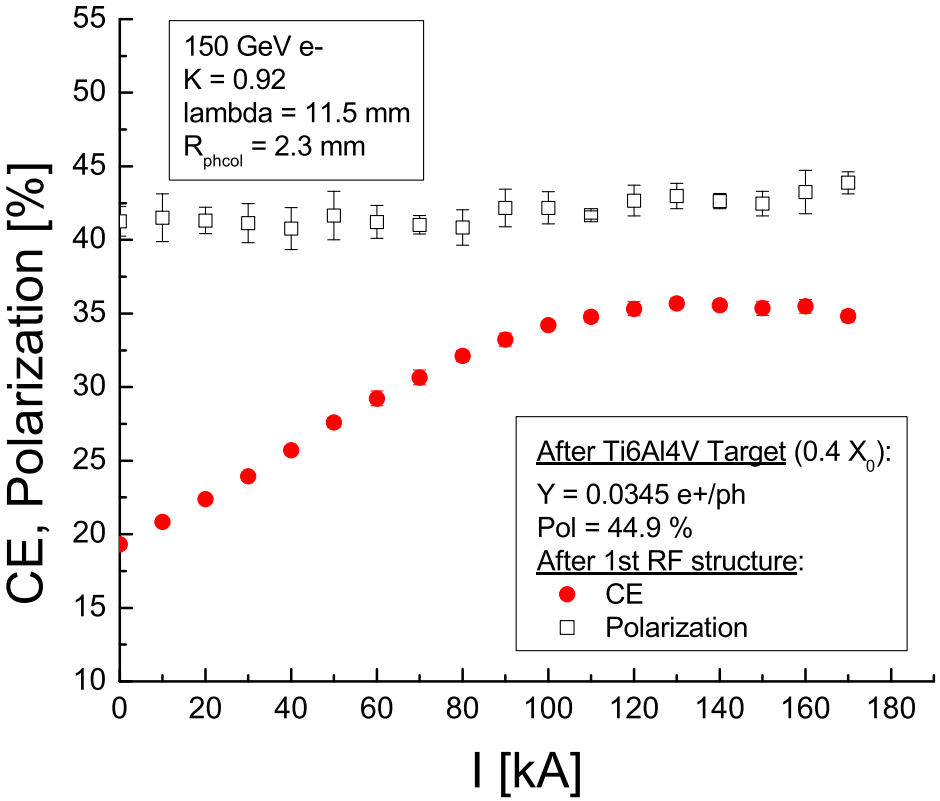
Source model

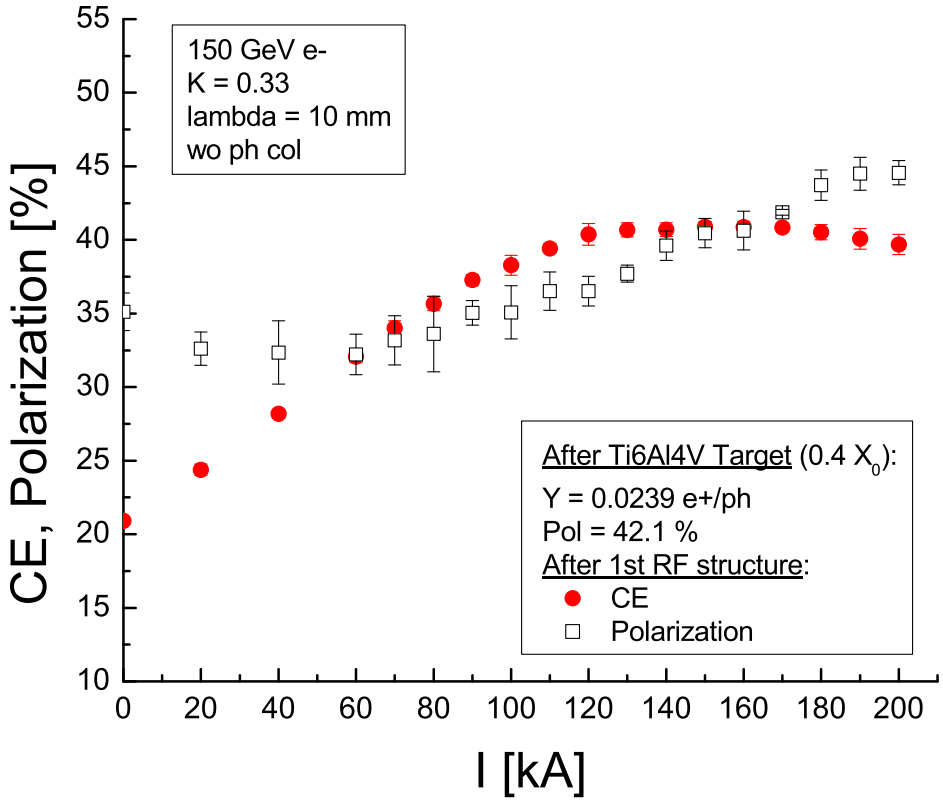


Assumptions used for simulation :

- B field exists only in Li ($B_\theta = Ir/(2\pi a^2)$) and capturing cavities (B_z = 0.5 T)
- there is no field between target and lens and also between lens and capturing cavity

K = 0.92 and K = 0.33. Ti-alloy target





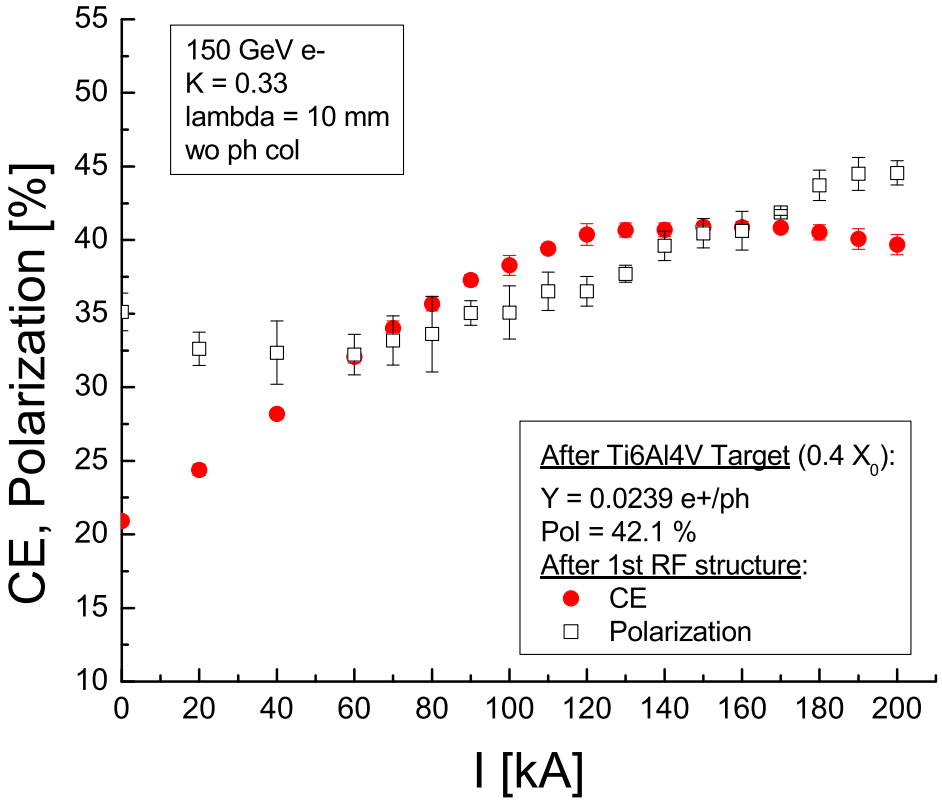
Capture efficiency is 21.35 % for

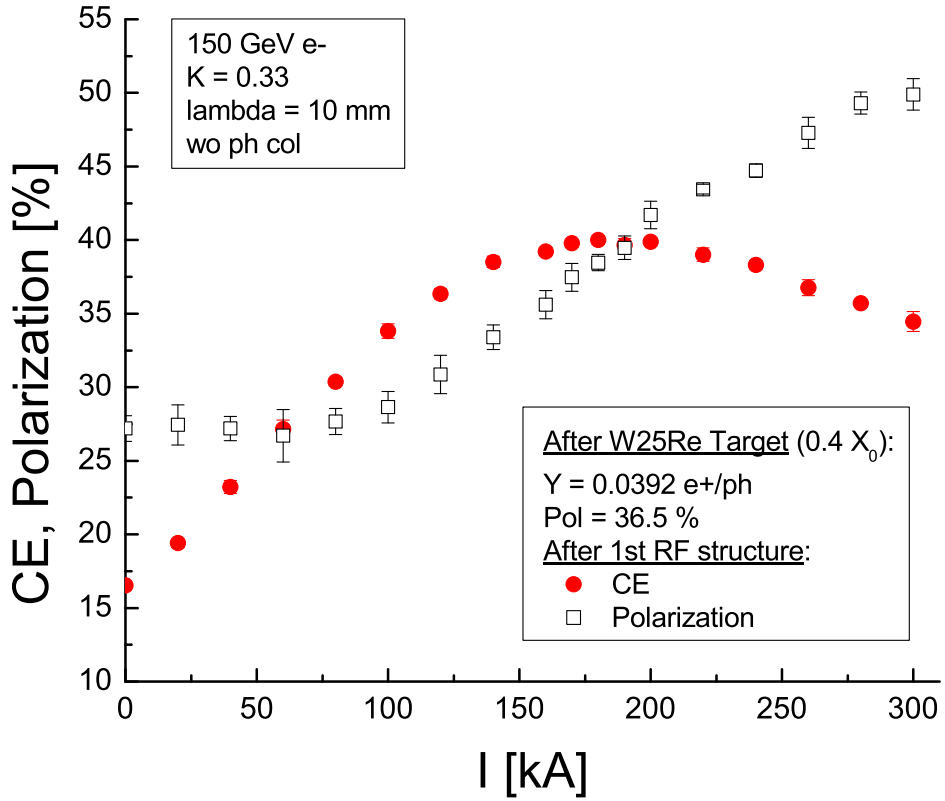
I = 130 kA and

DR acceptance of

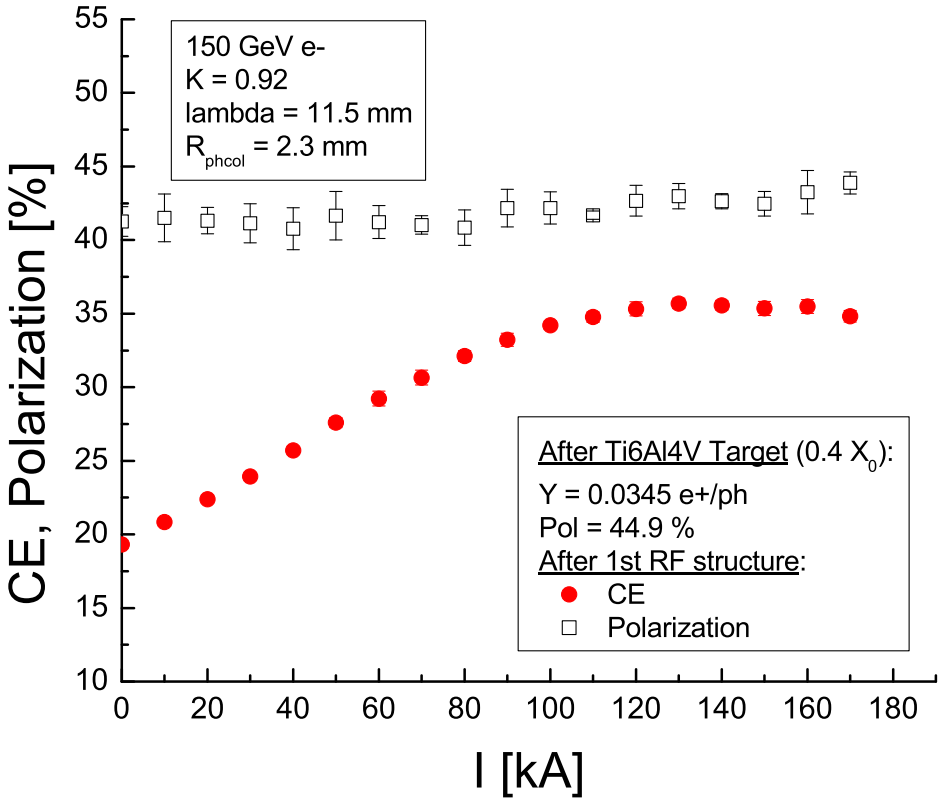
1 % of energy spread, 0.9 m rad (tranverse emittance)

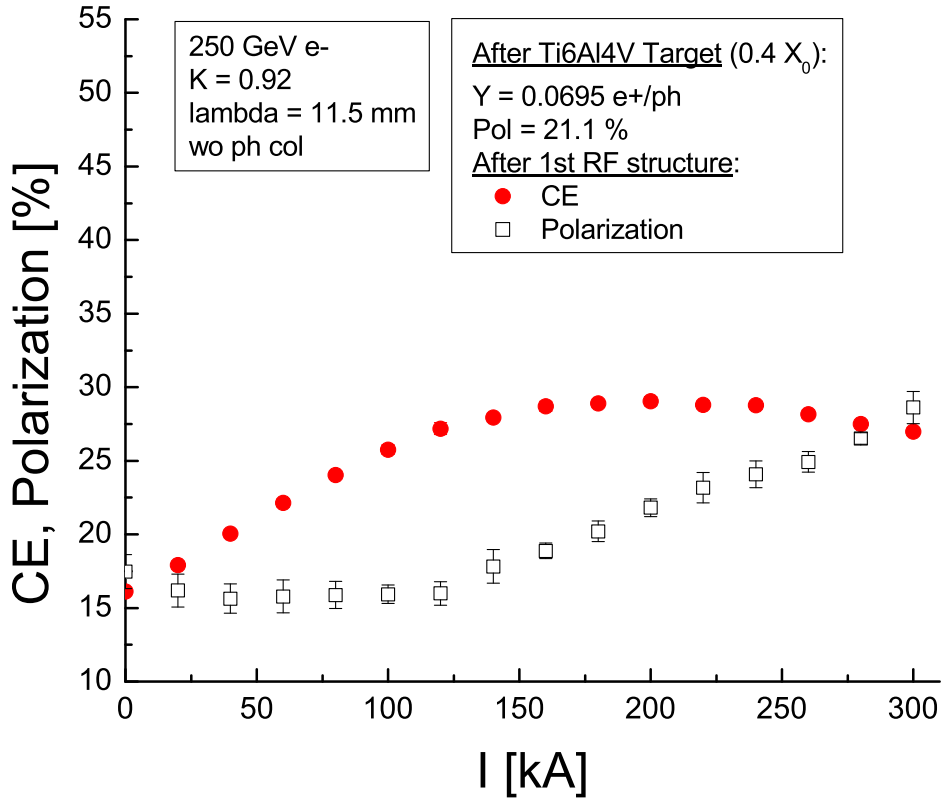
Ti- vs W- target





150 GeV vs 250 GeV drive e- beam





Summary and Outlook

- Positron polarization, capture efficiency have been estimated for undulator-based sources with Li-lens.

Future plan

- Estimate deposited energy and activation
- Calculate 3D magnetic field
- Optimize capturing optics

For further simulations the detailed model is needed.