Design and beam test of a low-energy positron production target (LDRD pre-proposal)

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CIS group meeting
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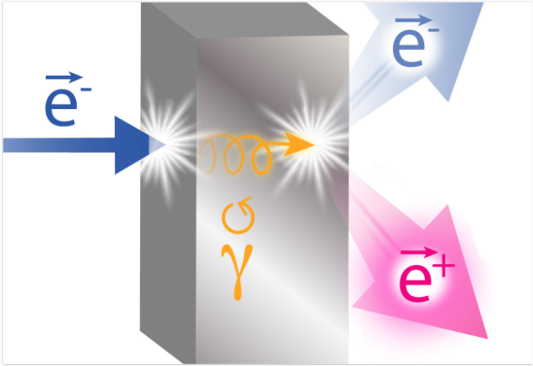

PEPPo logo, by Joe

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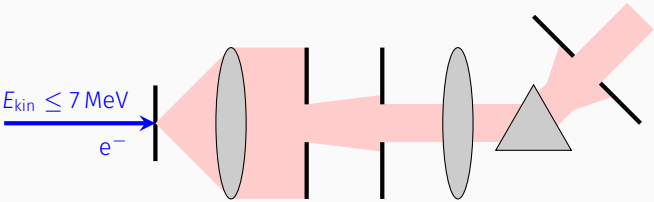
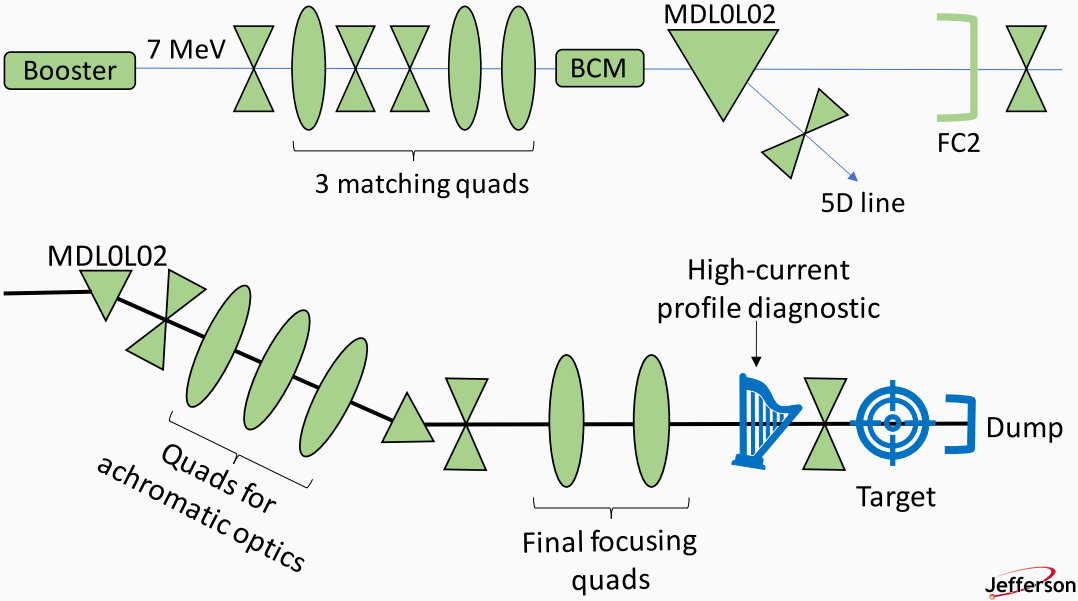
Idea: small-scale positron source

- primary energy $< 7\,\mathrm{MeV}$
  $\Rightarrow$ no activation
- could use CEBAF injector
- based on PEPPo experience
- challenges include
  - high e^- current
  - thermal management
  - background separation
  - collection optics design
  - low-current diagnostics
- ...to be studied in simulation

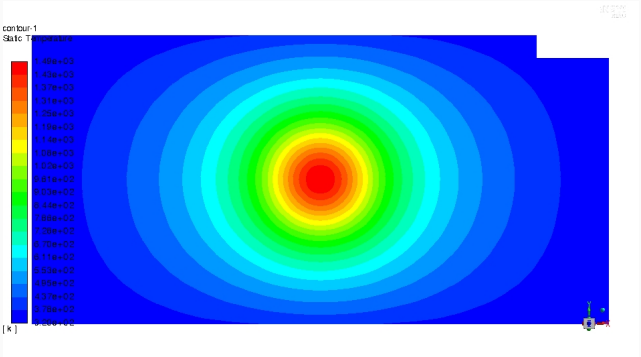


LDRD scope (1): electron beam line



LDRD scope (2): thermal management

- power density depends on beam spot size and thickness
- evaluate temperature rise as function of spot size and current
- wiggling enables study of temperature distribution



Simulation by Silviu: $\sigma = 1\,\mathrm{mm}$, $P = 326\,\mathrm{W}$, $T_{\max} = 1500\,\mathrm{K}$

Assuming all this works out...

Beyond the LDRD scope:

- keep electron beam line
  - irradiation (physics)
  - more target tests
- build e^+ collection, make e^+ beam
- first demonstration of polarized, c.w. e^+ beam at useful current
- model verification as important step towards high-power target