- **Influence of Beam Loading in the Positron Capture Section**

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The production of intense high-quality positrons for R&D in high-energy physics colliders and other applications, is achieved using GeV-energy electrons impinging on a hybrid tungsten target. The positrons emerge from the target with a large momentum spread and at not-relativistic energies, and they have to be accelerated rapidly in order to be transported to the next stages of the accelerator.

The CLIC positron source consists of a hybrid target, an adiabatic matching device and a capture linac. The parameters of this devices influence strongly the final useable positron yield.

For time being, the positron source has been studied with simplified simulations in particular for the capture linac. We use a generic 1.5 m long 2 GHz travelling wave accelerating structure to capture the positrons. In the tracking simulations, a fixed gradient is assumed. In reality, the capture structure suffers strong beam loading from both the positrons and the remaining electrons from pair production. It is therefore difficult to evaluate the real gradient of the structure and its stability along the pulse.

We want to develop a theoretical framework to study this questions and evaluate the consequences for the positron source.

The objective of this study is the effect of transient beam loading on the positrons as they travel through the accelerating components of the linac. Even though steady-state models of beam loading for relativistic beams exist in literature, the case of non-relativistic positrons has not yet been addressed.

Finally, it would be great to use a simplified analytical description, which could be implemented into a fast tracking code like RFTRACK to study the problem in detail with realistic particle distributions.

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