

1 GeV Linac Design Scenarios

Scenario I

In this SRF Linac design we assume that the low β cavities will operate with peak surface electric fields $E_{\text{peak}}=27.5 \pm 10\%$ MV/m with a uniform distribution. The high β cavities will operate with an average $E_{\text{peak}}=35$ MV/m with a skew “Sundelin” distribution (no disrespect intended). To reach 1 GeV we will reduce the operating phase of the high β cavities to -19.5° . The design parameters of this design are summarized in figure 1.

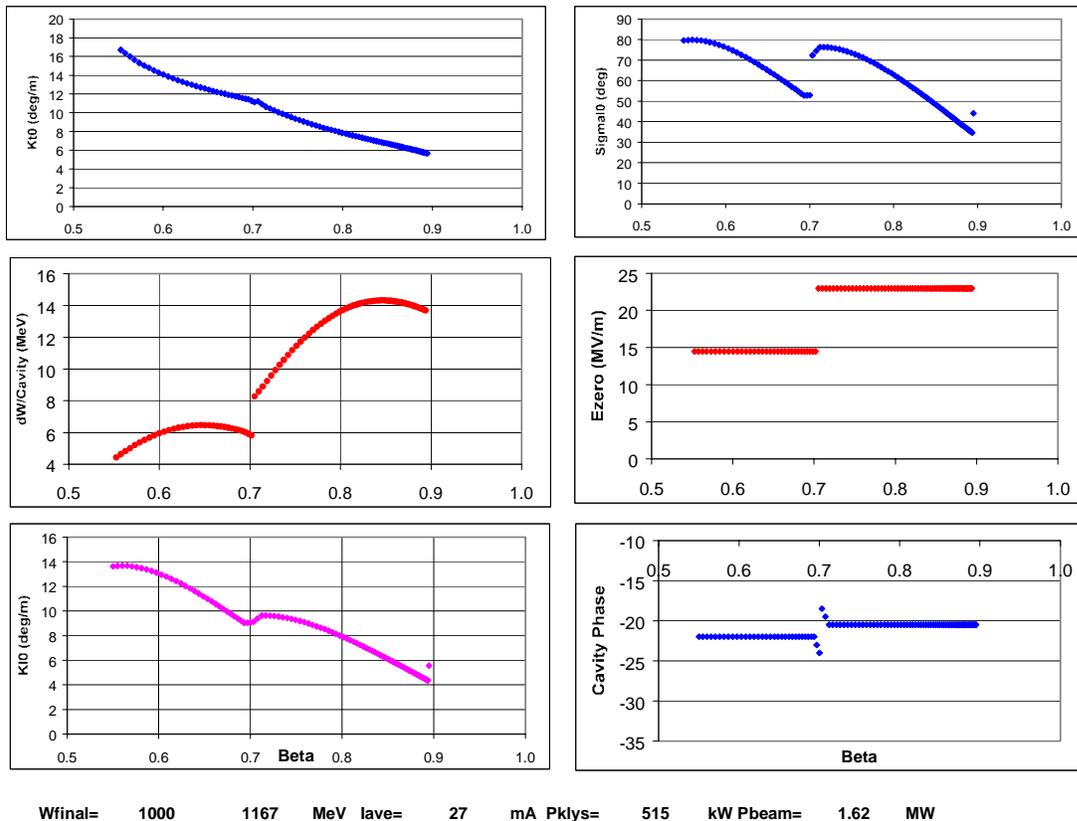


Figure 1. 1GeV high gradient design

This linac has 33 low β cavities and 81 total cavities and klystrons. The final design energy is 1 GeV but the macropulse beam current is limited to 27 mA for a total beam power of 1.62 MW. Based on the uncertainty in actual cavity performance we can expect to reach 1 GeV with a 50% certainty. However with a 90% certainty we can expect that the final energy greater than 990 MeV. See Figure 2.

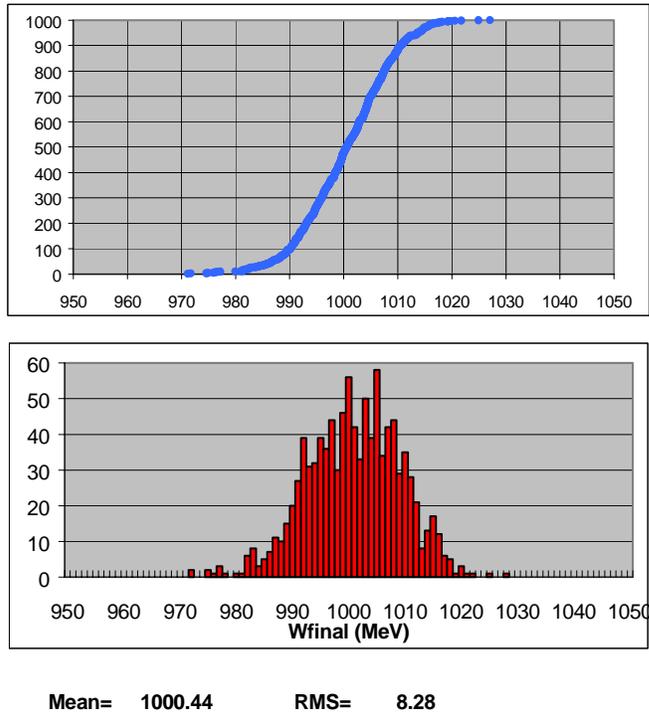


Figure 2. Expected Exit energy of the High Field Design

Scenario II

In this modified extended version of the “truncated-baseline” design we assume that the all SRF cavities will operate with peak surface electric fields $E_{\text{peak}}=27.5 \pm 10\%$ MV/m with a uniform distribution. This linac has 33 low β and 60 high β cavities for a total of 93 cavities and klystrons. To reach 1 GeV we will have to reduce the operating phase of the high β cavities to -17.5° ! The design parameters of this design are summarized in figure 3.

