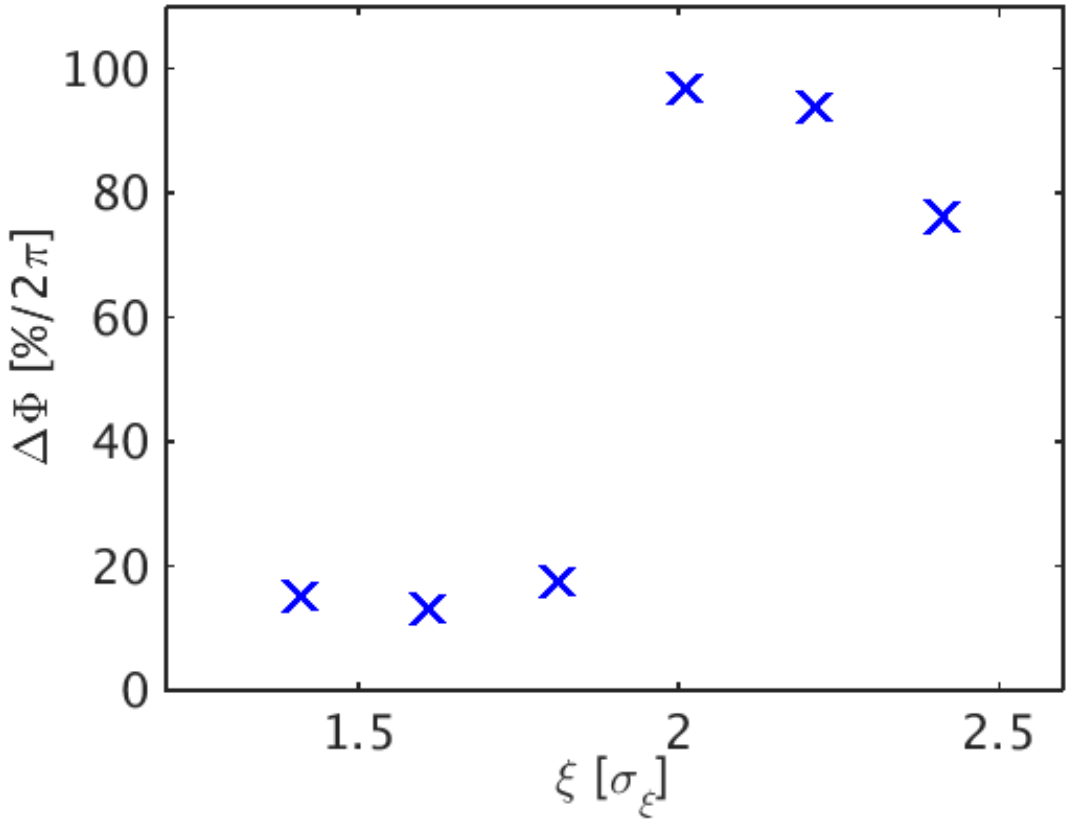
Group meeting

30.08.19

Fabian

Seed wakefields

Calculate the transverse seed wakefields for the SMI-SSM transition point at 1.8 σ



Seed wakefields - formulas

The transverse wakefield:

$$W_r(\xi, r) = \frac{-n_{b0}e}{\epsilon_0 k_{pe}} \int_{-\infty}^{\xi} n_{b\|}(\xi') \sin(k_{pe}(\xi - \xi'))d\xi' \cdot \frac{dR(r)}{dr}$$

with their dependency of the long. wakefields R(r) :

$$R(r) = k_{pe}^2 K_0(k_{pe}r) \int_0^r r' n_{b\perp}(r') I_0(k_{pe}r')dr' + k_{pe}^2 I_0(k_{pe}r) \int_r^{\infty} r' n_{b\perp}(r') K_0(k_{pe}r')dr'$$

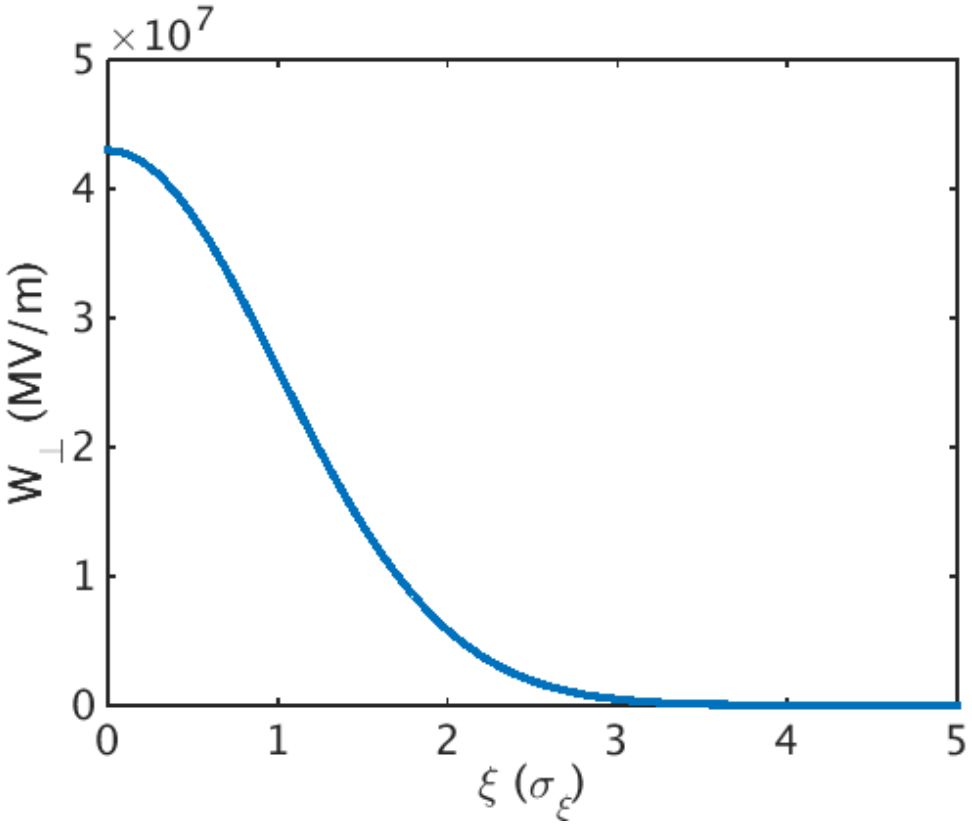
And

$$\begin{aligned}\frac{dR(r)}{dr} &= k_{pe}^2 K_0(k_{pe}r) r n_{b\perp}(r) I_0(k_{pe}r) - k_{pe}^3 K_1(k_{pe}r) \int_0^r r' n_{b\perp}(r') I_0(k_{pe}r')dr' \\ &+ k_{pe}^2 I_0(k_{pe}r) r n_{b\perp}(r) K_0(k_{pe}r) - k_{pe}^3 I_1(k_{pe}r) \int_r^{\infty} r' n_{b\perp}(r') K_0(k_{pe}r')dr'.\end{aligned}$$

K_0, K_1, I_0,I_1 are Bessel function

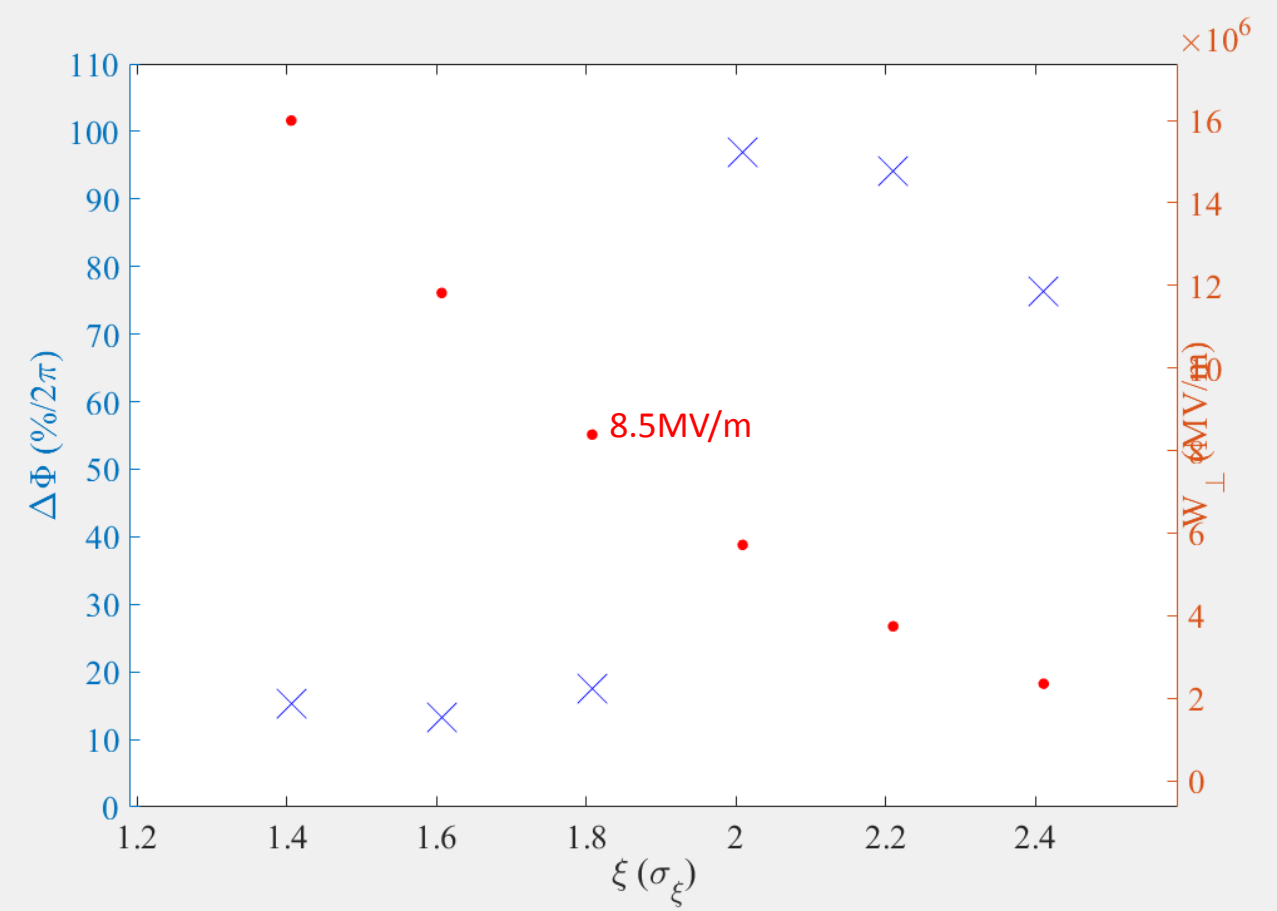
Seed wakefields

The Result: $W_r(\xi)$



Seed wakefields

The Result: at ξ=1.8 σ, W_r = 8.5 MV/m



(layout to be improved)