An electron beam is normally defined by its (6+1) 7 parameters.

Phase-space + charge = (x, y, z, px, py, pz) + charge

Input in many simulations is like: σ_x , σ_y , σ_z , ε , γ , $\Delta \gamma$, Q + distribution

In impactX we give: Beam kinetic energy (E_b).

Bunch charge.

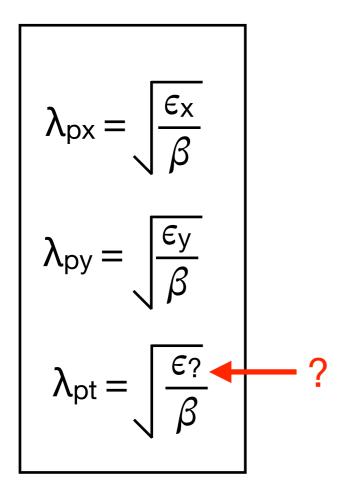
Particle numbers (npart).

&

Particle bunch distribution (waterbag)

$$\lambda_q = \sqrt{rac{\epsilon}{\gamma}} \ \lambda_p = \sqrt{rac{\epsilon}{eta}} \ \mu_{qp} = rac{lpha}{\sqrt{eta \gamma}}$$

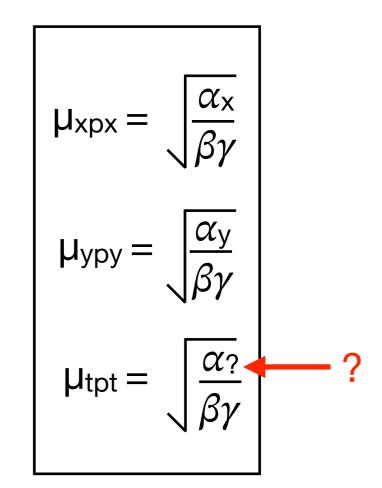
Further, input parameters for impactx



$$\lambda_{x} = \sqrt{\frac{\epsilon_{x}}{\gamma}}$$

$$\lambda_{y} = \sqrt{\frac{\epsilon_{y}}{\gamma}}$$

$$\lambda_{t} = \sqrt{\frac{\epsilon_{?}}{\gamma}}$$
?



We know beam kinetic energy, therefore, γ and β can be calculated.

Kinetic energy =
$$E_b = m_0c^2 (\gamma - 1)$$

$$\beta = \sqrt{1 - \left(\frac{1}{\gamma}\right)^2}$$

If we know ϵ_x and ϵ_y we may calculate λ_x , λ_y , λ_{px} , λ_{py} (right?)