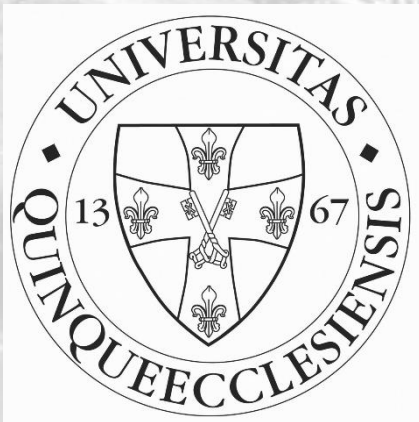


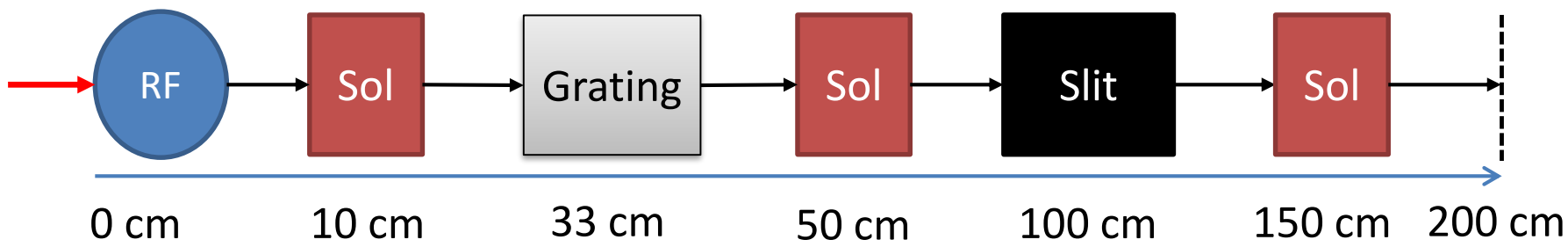
# Photoemission and bunch dynamics in GPT

Zoltan Tibai<sup>1</sup>

<sup>1</sup>Institute of Physics, University of Pécs, 7624 Pécs, Hungary



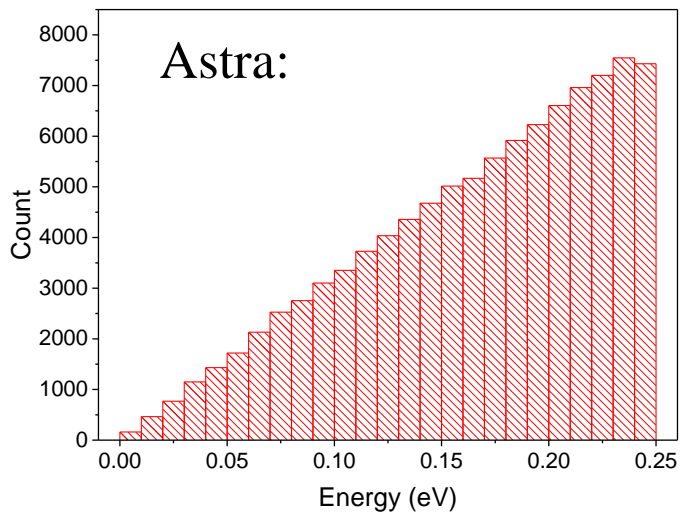
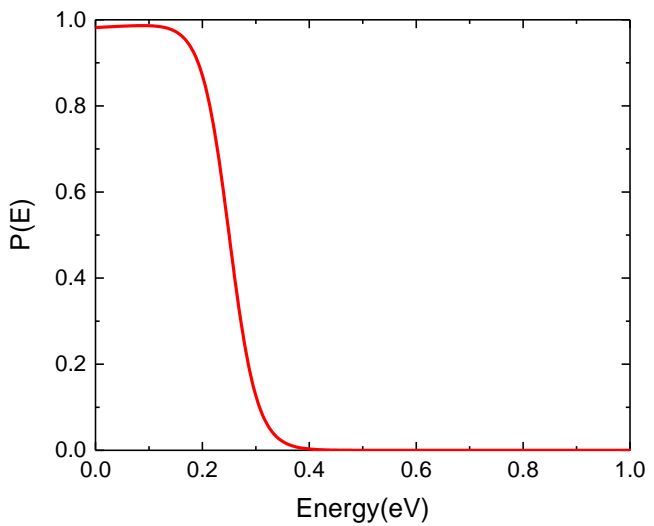
# Photoemission



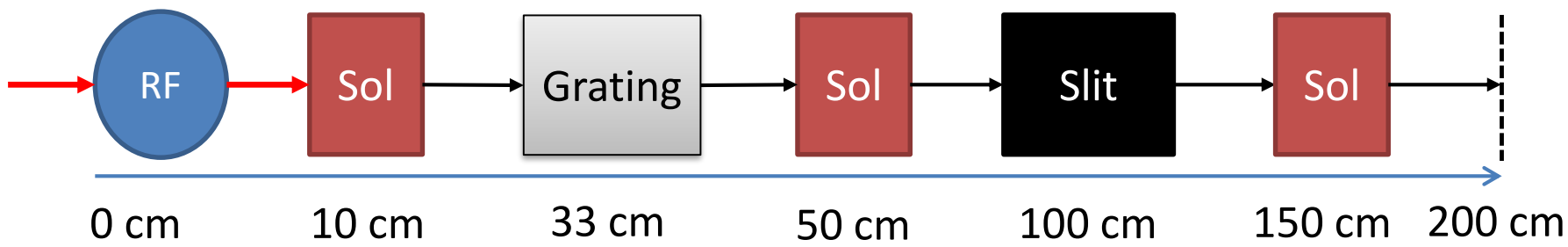
Fermi-Dirac probability function: 
$$n(E) = g_c(E)f(E) \sim \sqrt{E} \frac{1}{1 + e^{\frac{E-E_F}{kT}}}$$

Parameters:

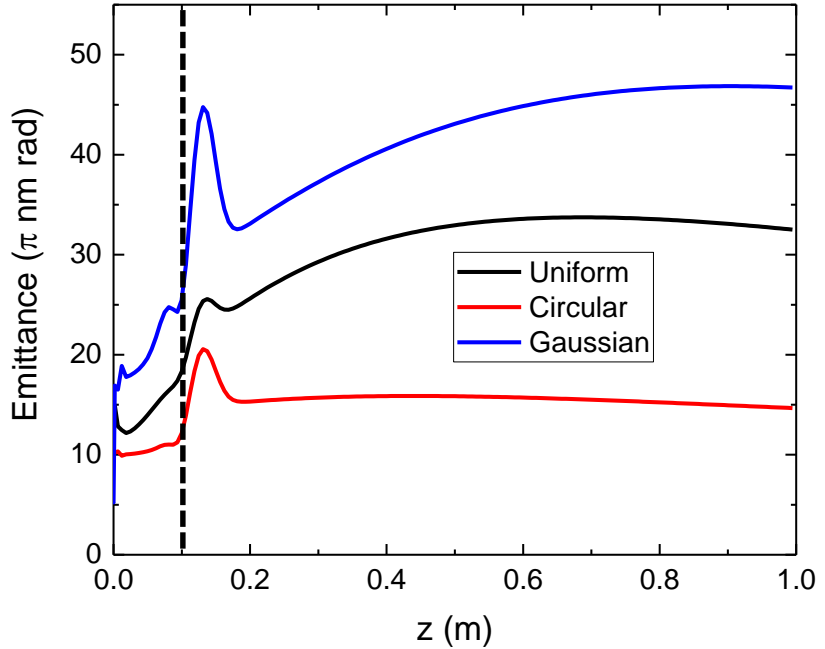
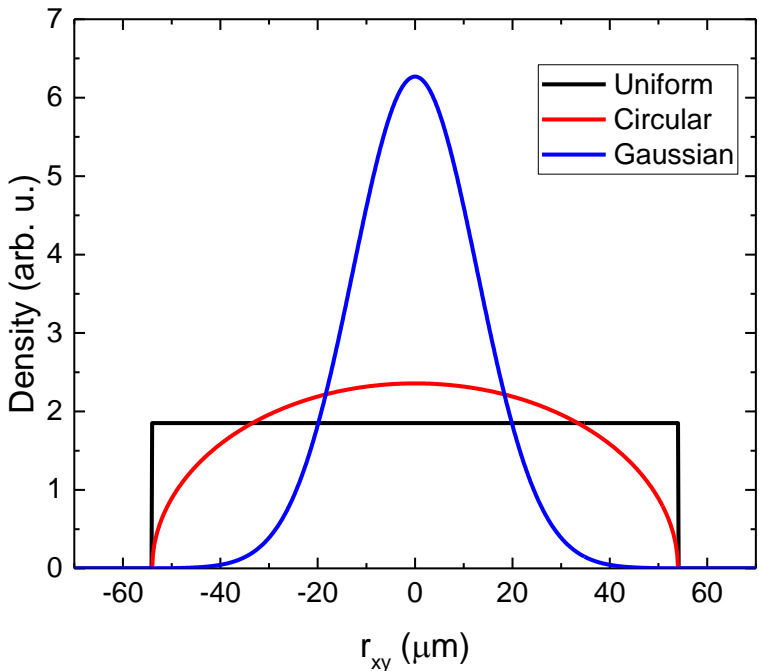
- $T = 300 \text{ K}$
- $E_{\text{photon}} = 4.71 \text{ eV}$
- $\varphi_{\text{eff}} = 4.46 \text{ eV}$
- $E_F = 7 \text{ eV}$



# Comparison of the transverse distributions



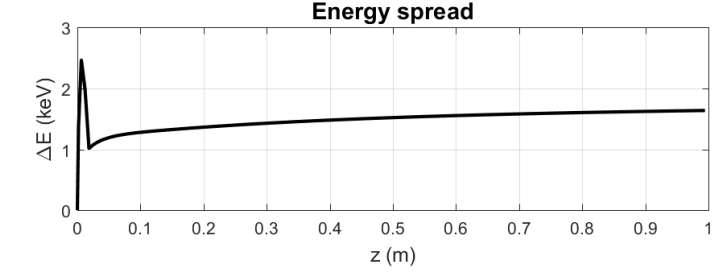
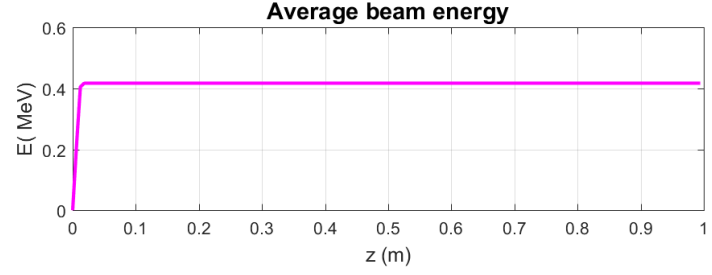
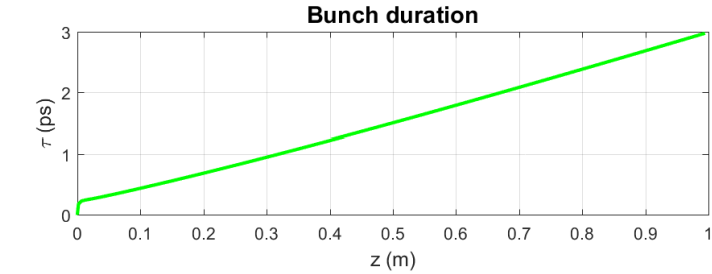
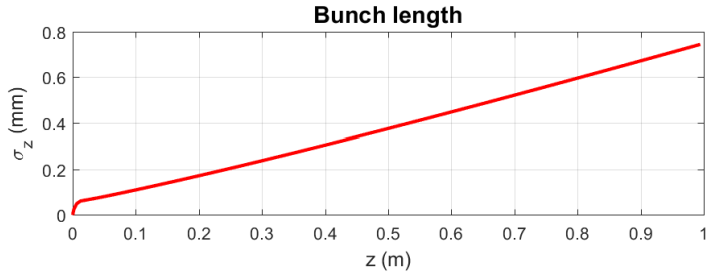
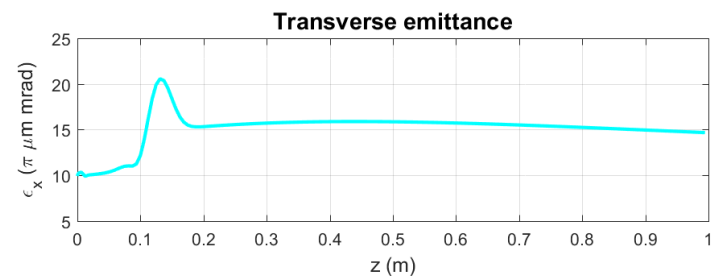
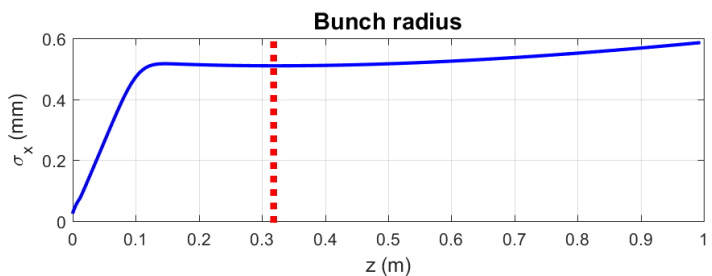
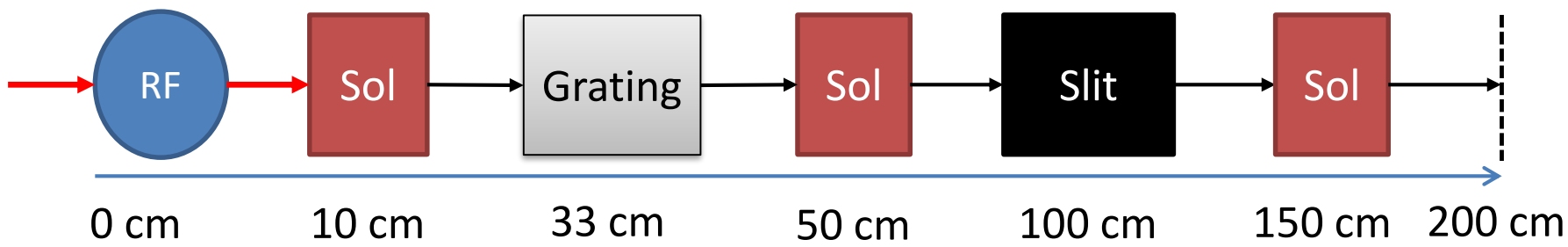
Parameters:  $r_{xy} = 54 \mu\text{m}$ ,  $\tau = 30 \text{ fs}$ ,  $Q = 160 \text{ fC}$ ,  $B_z = 0.075 \text{ T}$



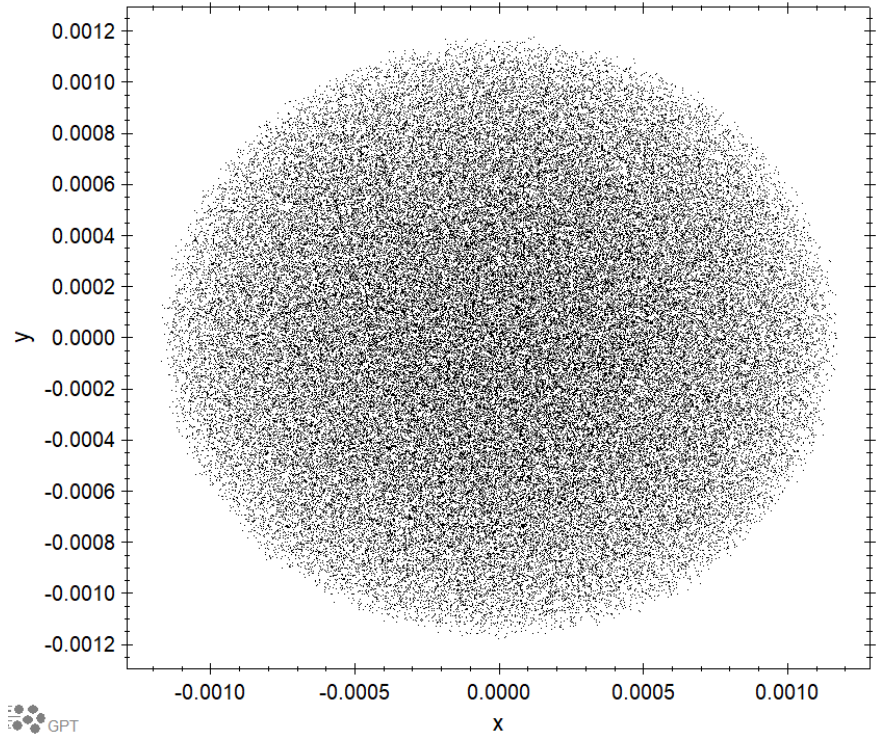
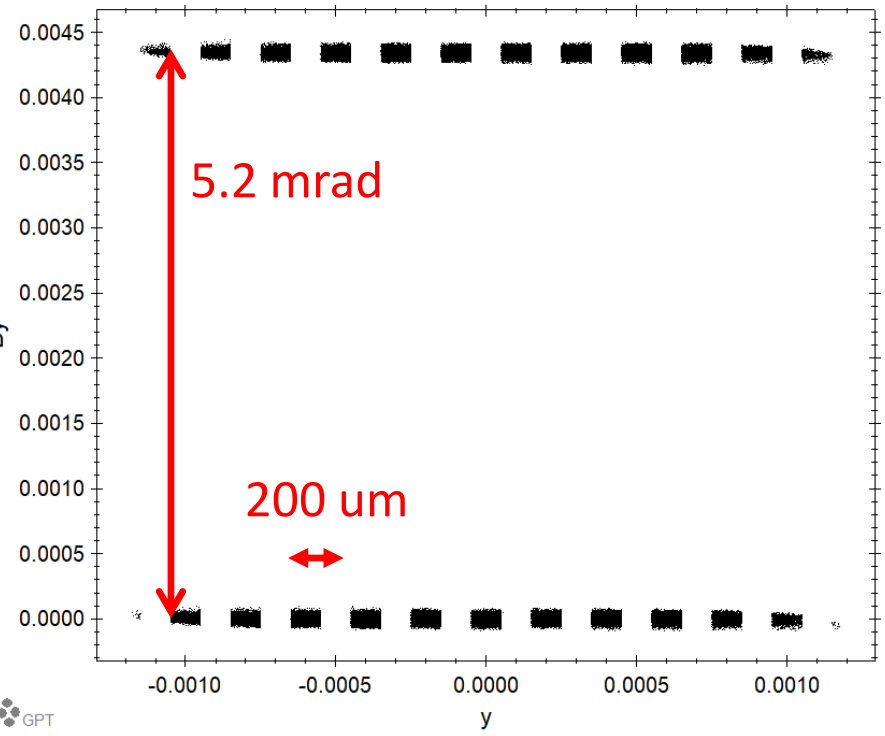
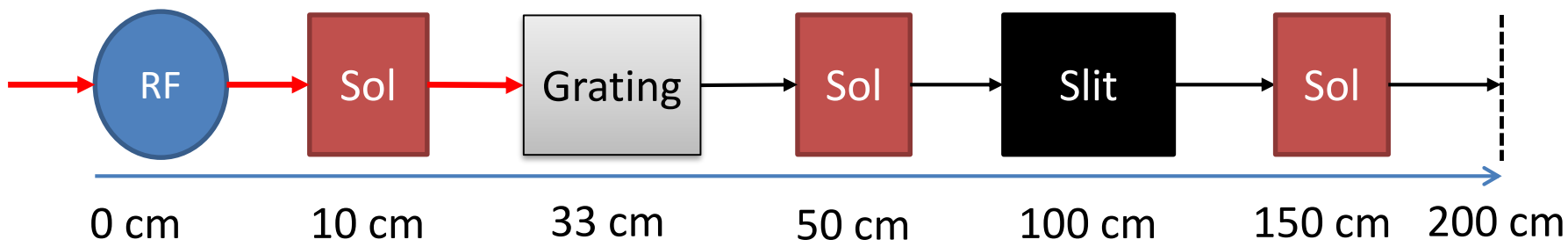
Energy and transverse distribution: *Dist\_generator.m* file uploaded



# Result of circular distribution

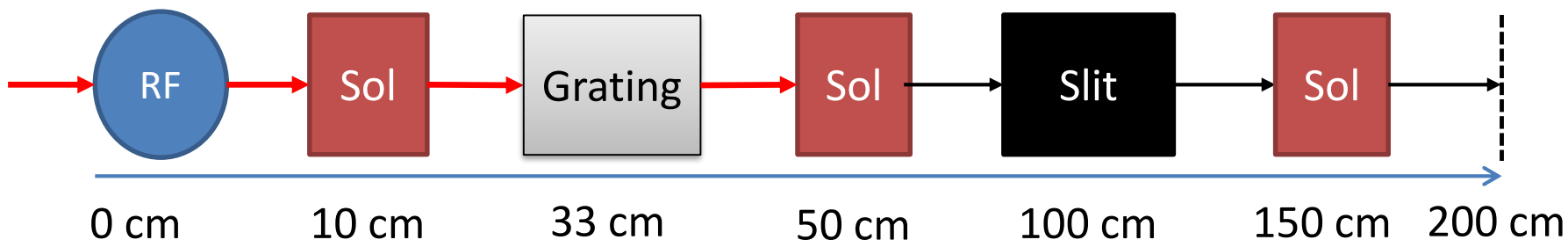


# Grating (at 33 cm)



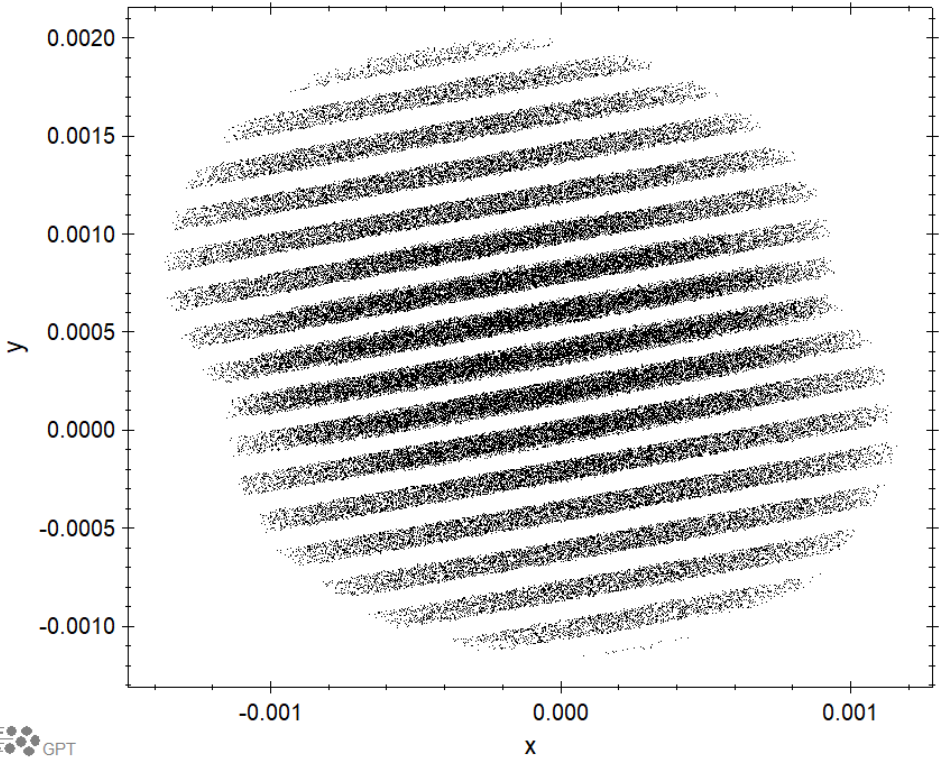
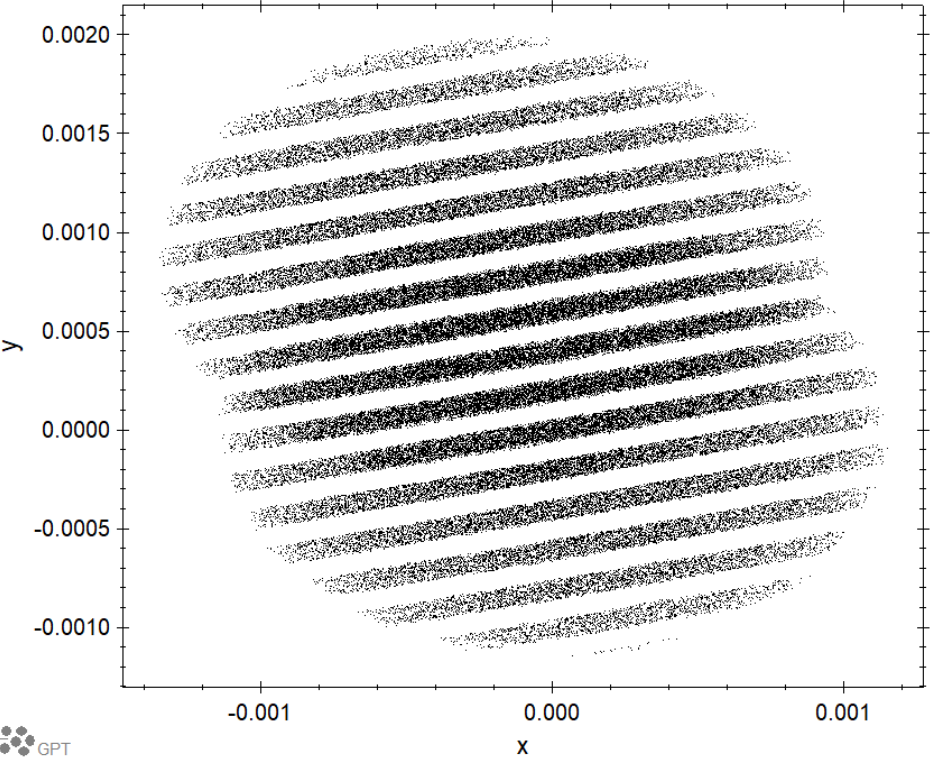


# Solenoid (at 50 cm)

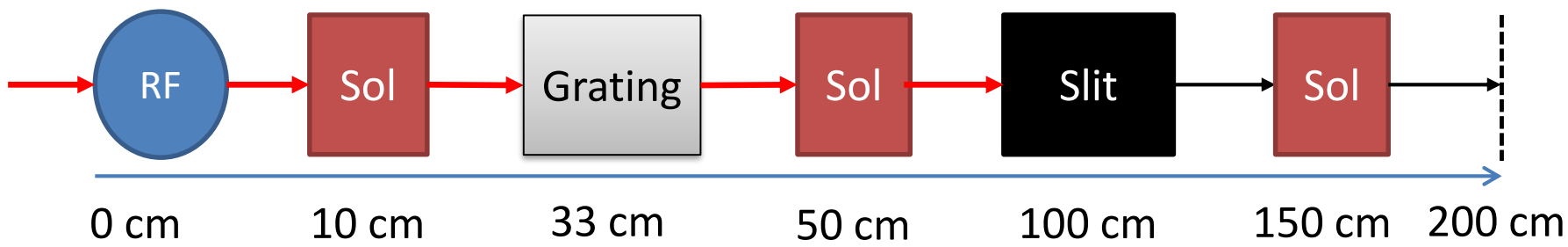


without space charge

with space charge

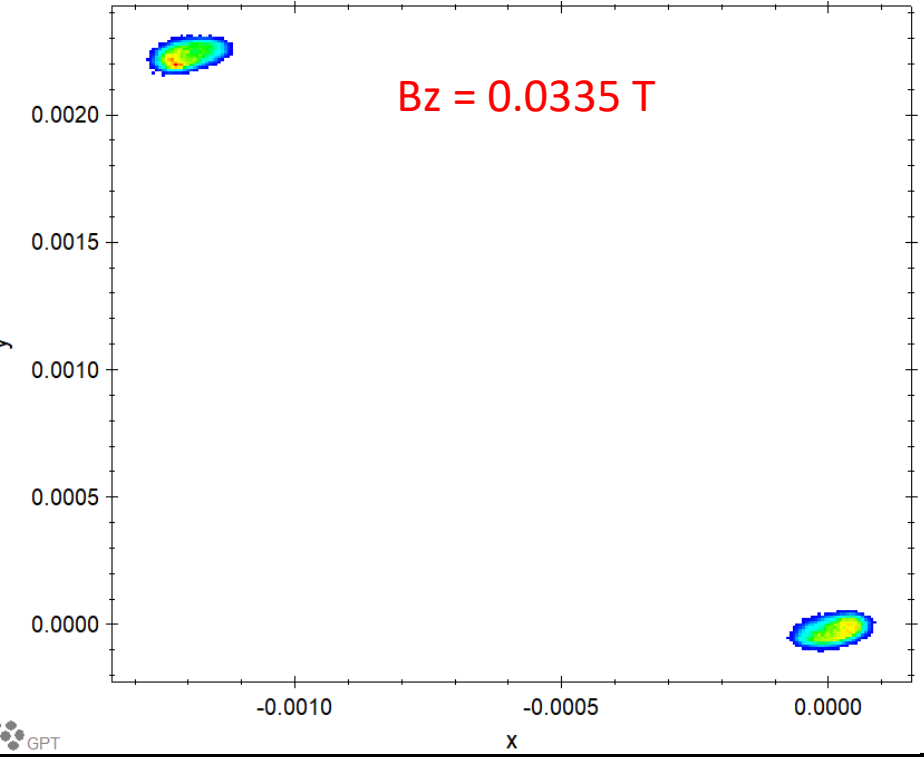
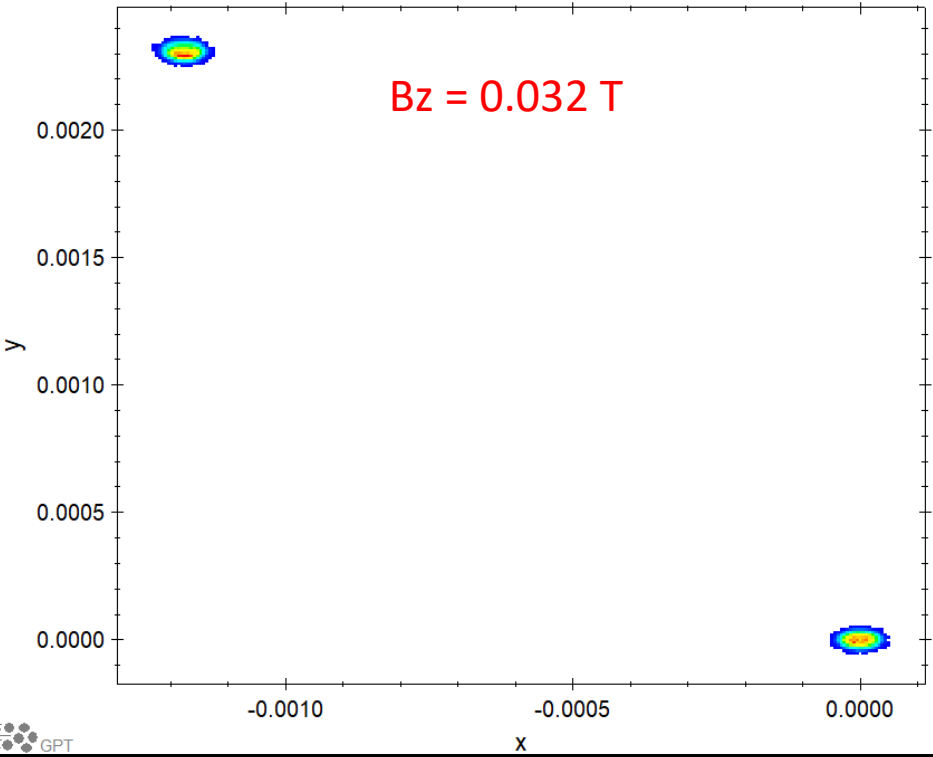


# Slit (at 100 cm)

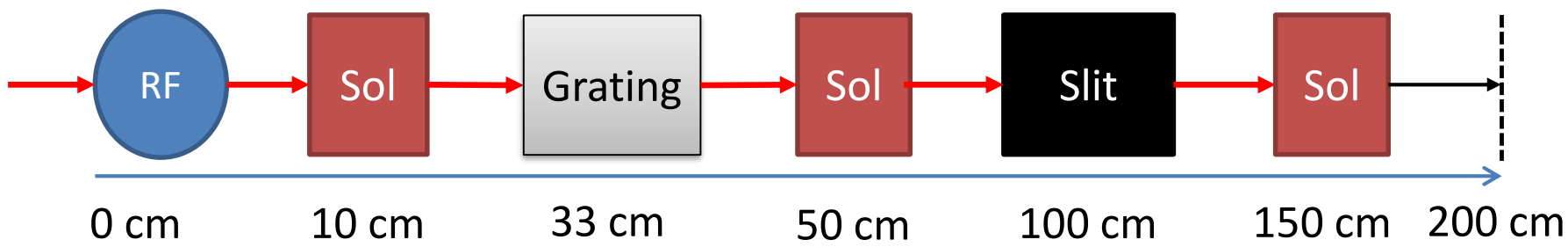


without space charge

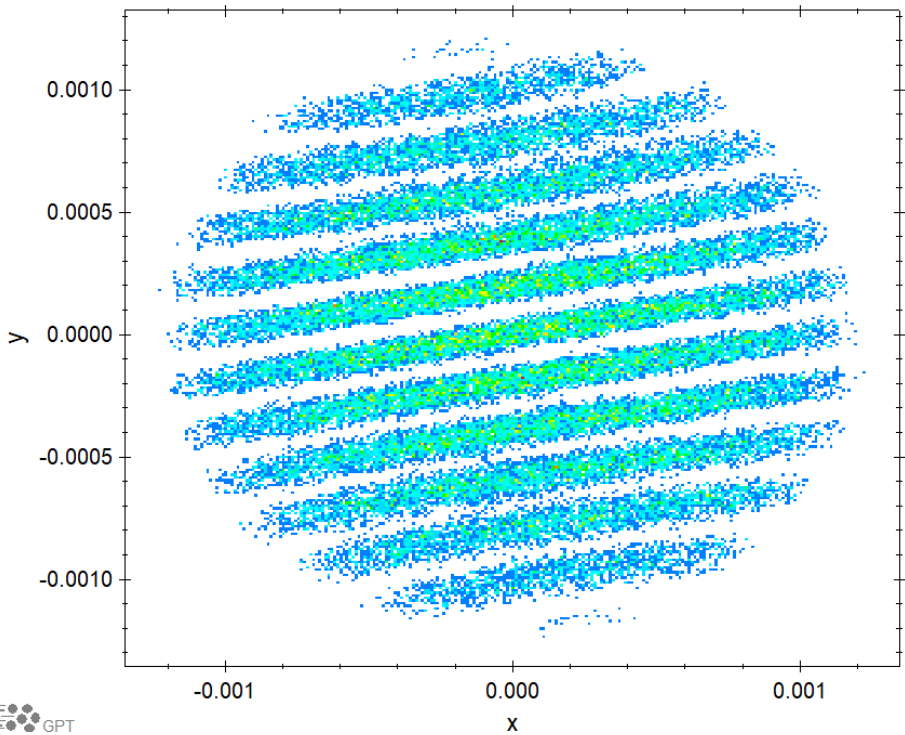
with space charge



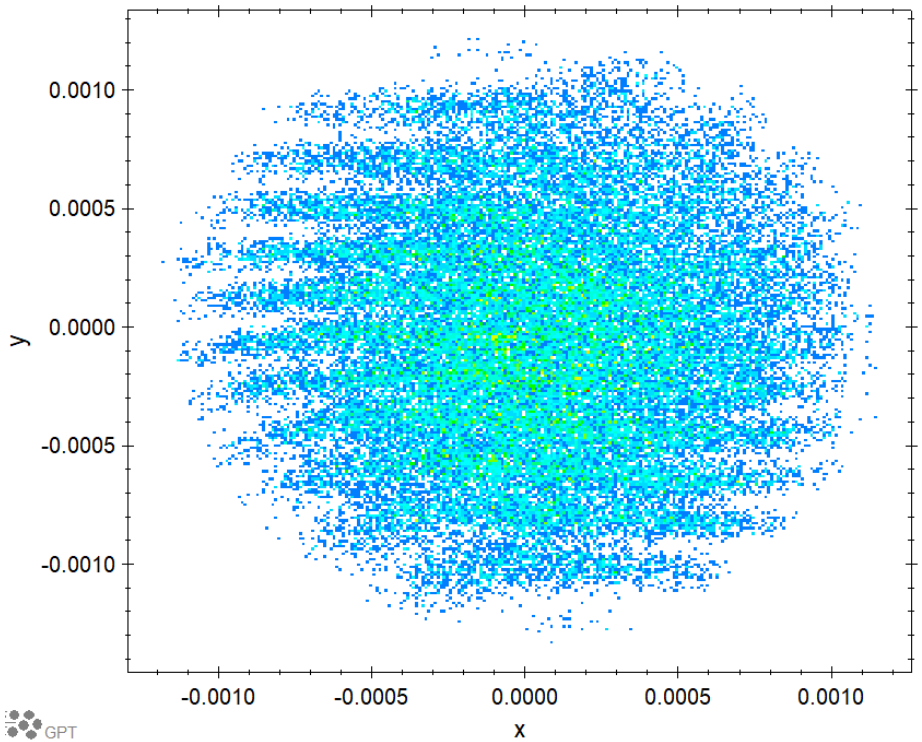
# Solenoid (at 150 cm)



without space charge

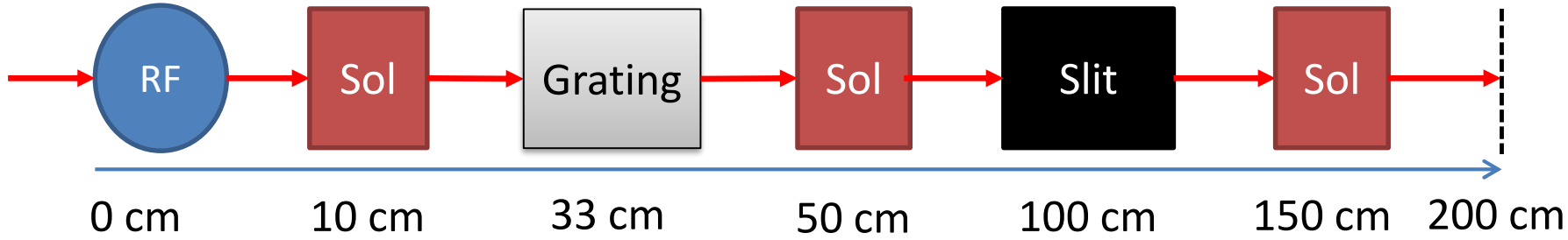


with space charge

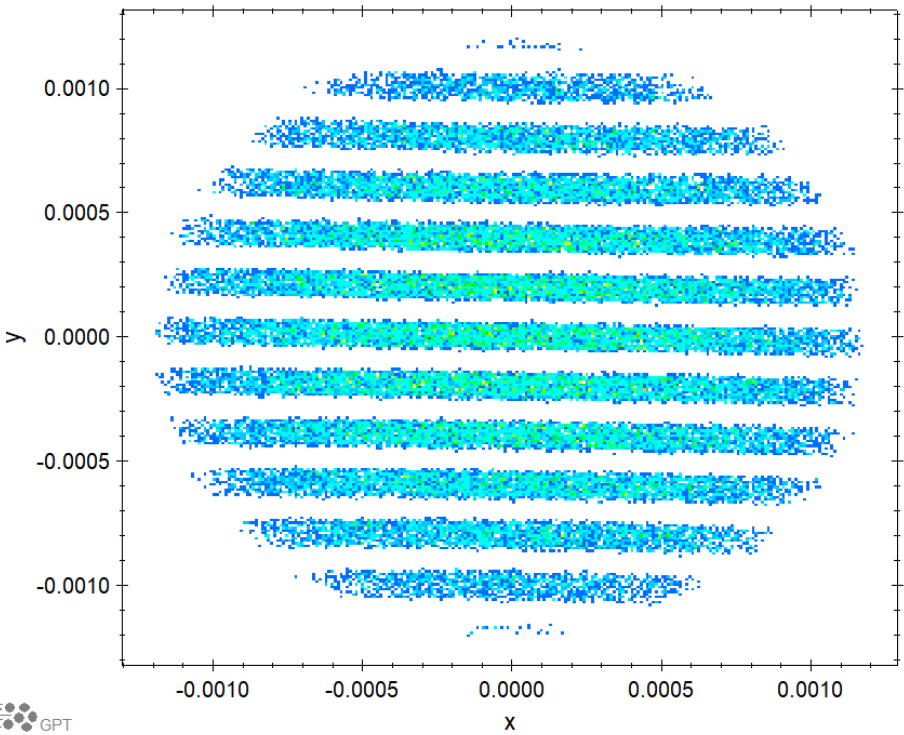




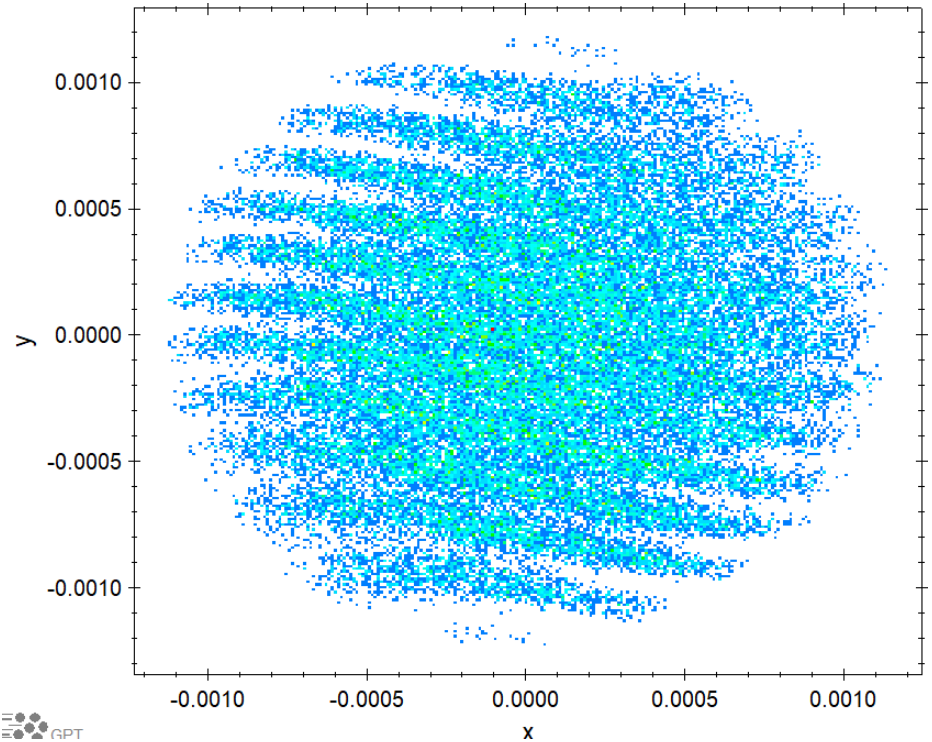
# Screen (at 200 cm)



without space charge



with space charge



# Future plan

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- Optimization of the strength of the 2nd and 3rd solenoids
- Reduce the effect of the space-charge
- ...

An aerial photograph of a university campus, featuring a large central building with a prominent tower and clock face, surrounded by other academic buildings and greenery. The image is overlaid with a semi-transparent green filter.

**Thank you for your attention!**

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