



Meeting

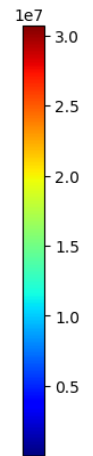
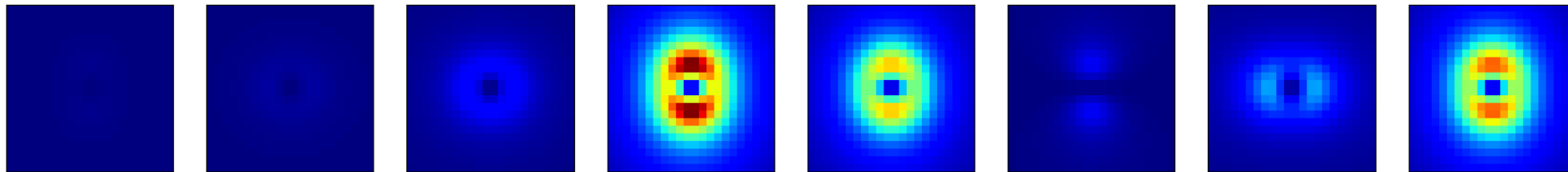
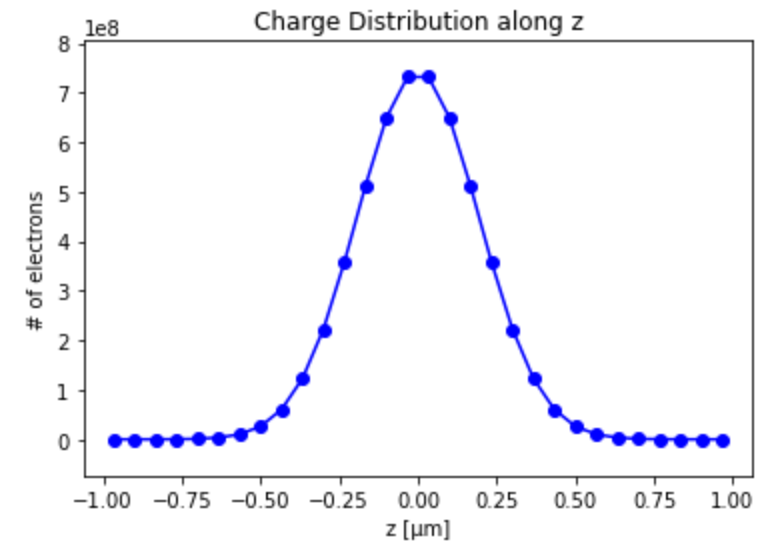
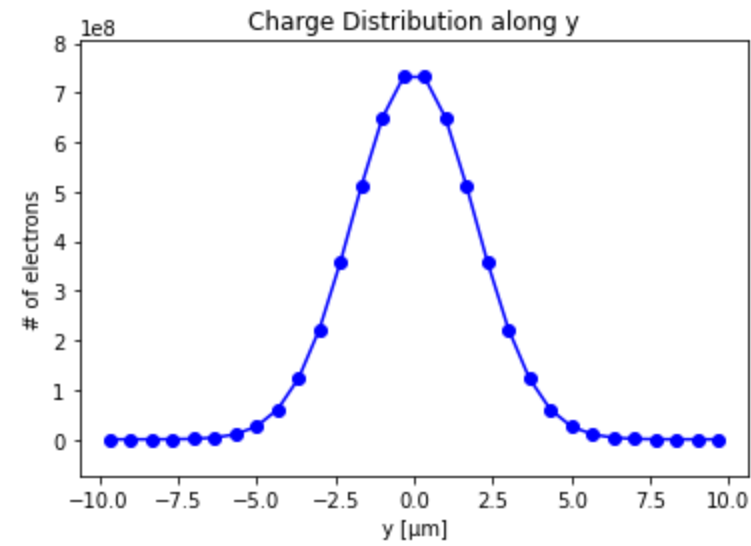
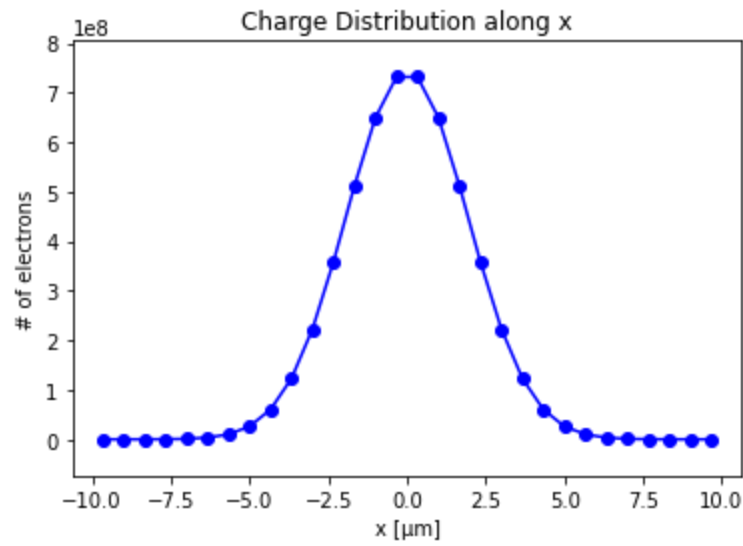
Ze Ouyang

Feb 5th, 2025

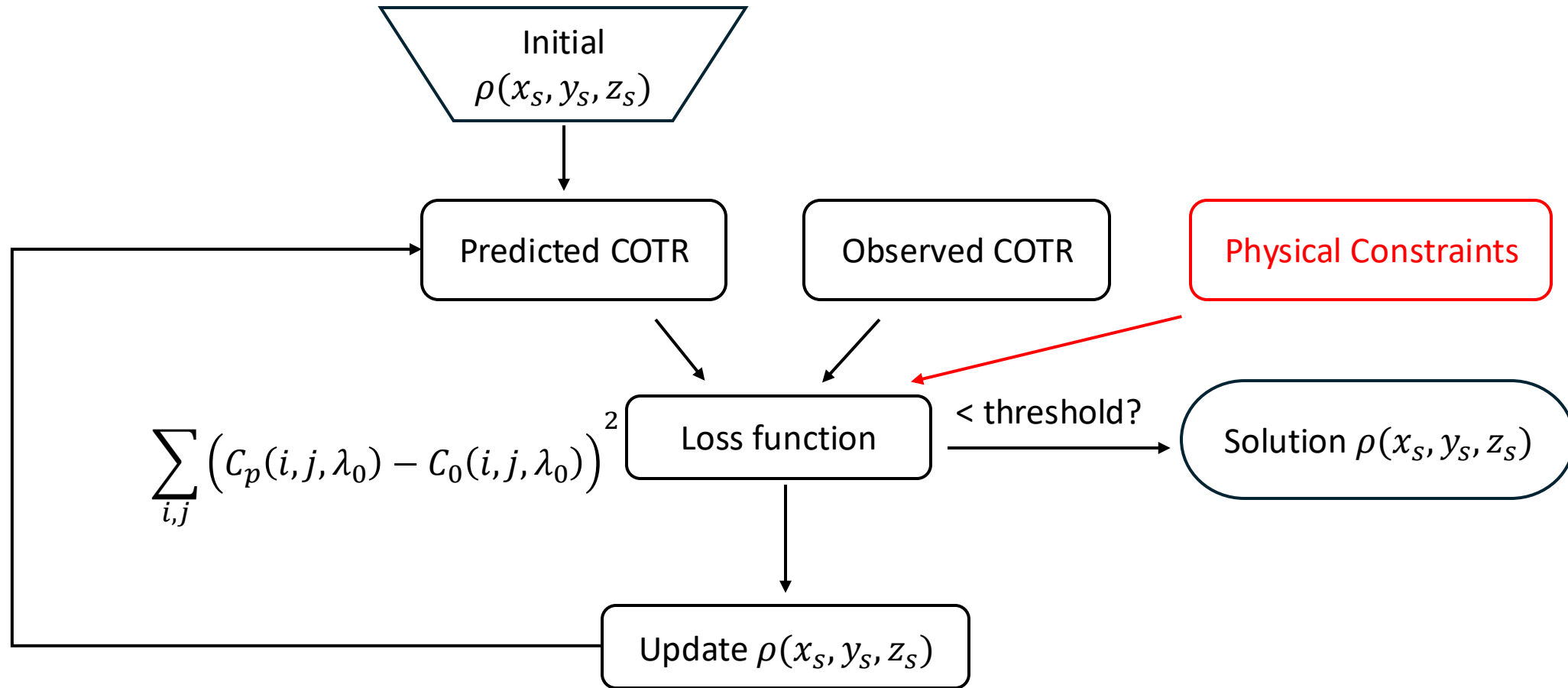
Content

1. Reconstructions with synthetic data
2. Recap on shot 228
3. Self-injection data pre-process

Ground Truth



Reconstructions with Penalty

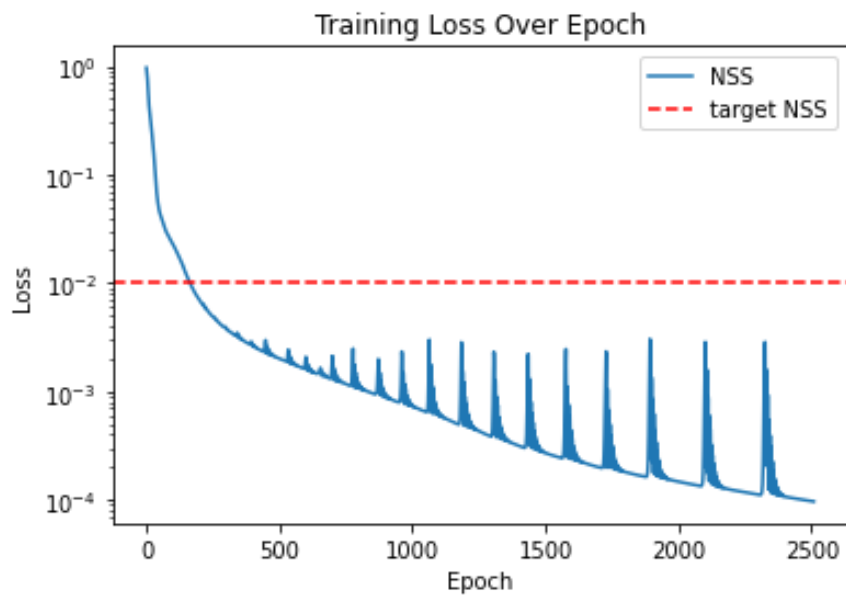
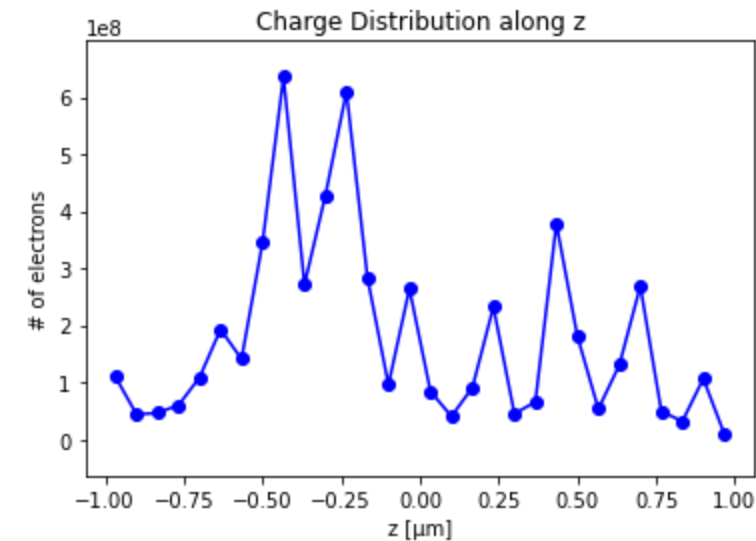
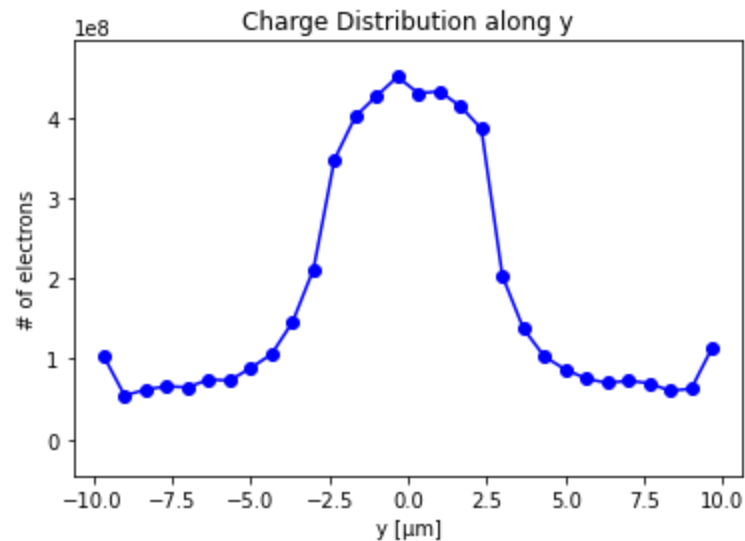
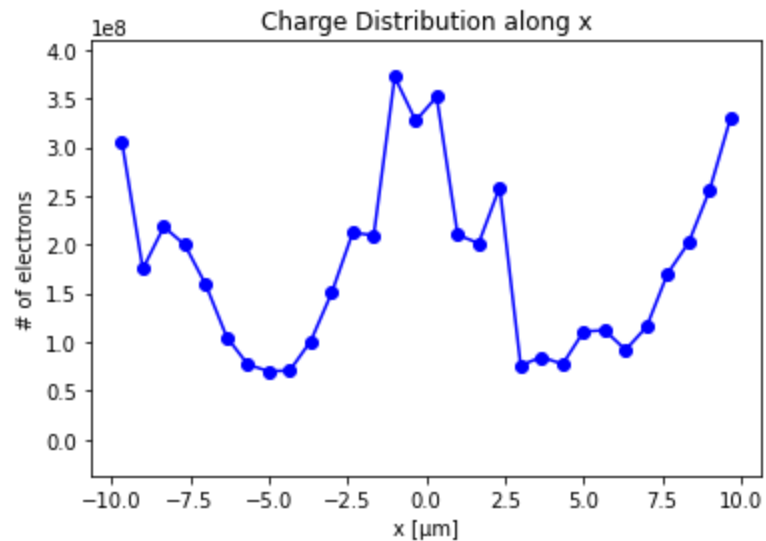


$$\sum_{i,j} \left(C_p(i,j, \lambda_0) - C_0(i,j, \lambda_0) \right)^2 + \lambda_1 \sum_{i,j} \left(\rho_p(i,j) - \rho_b(i,j) \right)^2 + \lambda_2 \sum_i \left(\rho_{z,p}(i) - \rho_z(i) \right)^2$$

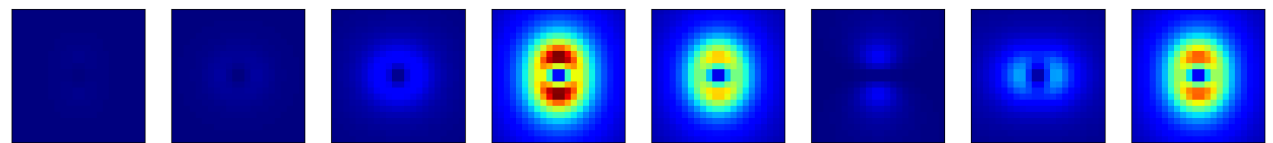
Boundary condition

z -profile

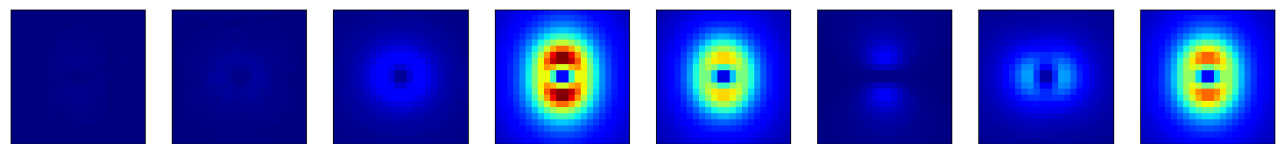
Reconstructions with Penalty-Free



Ground Truth



Reconstructed



NSS ≈ 0.0001

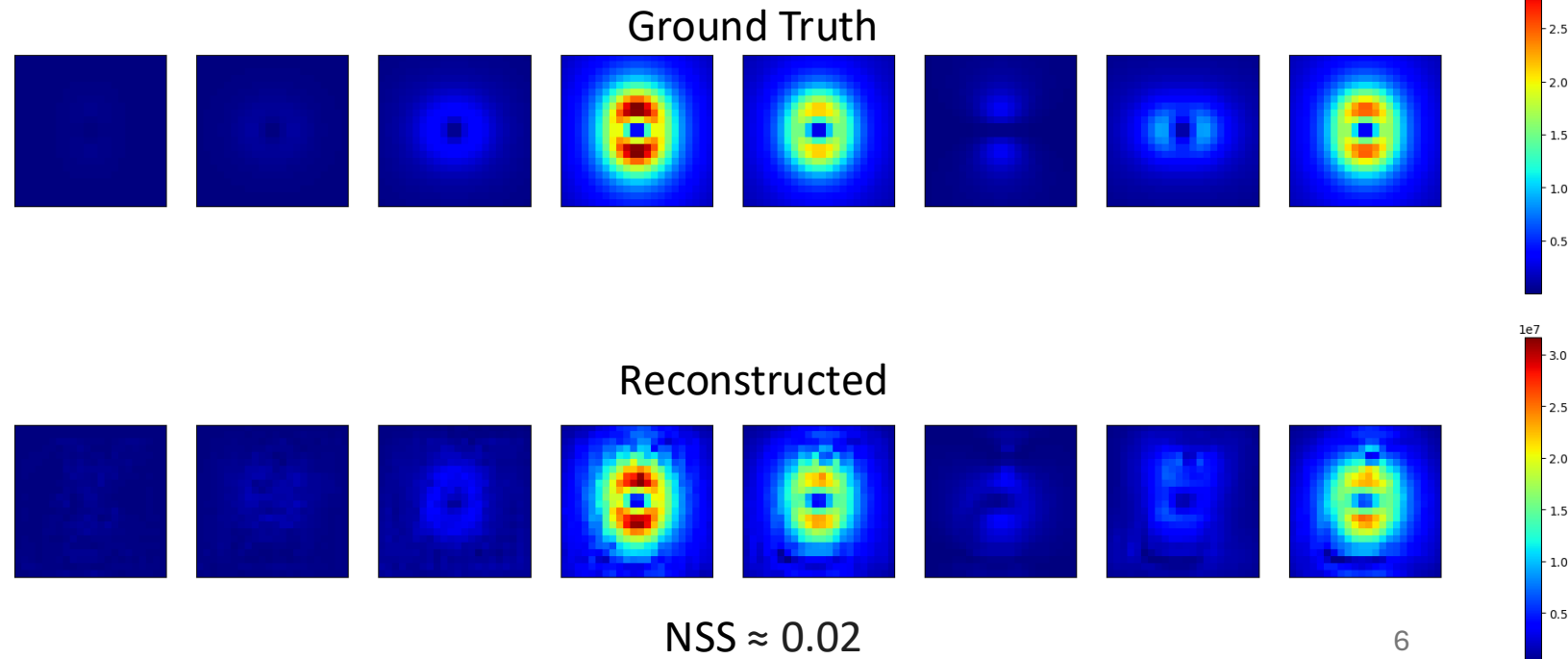
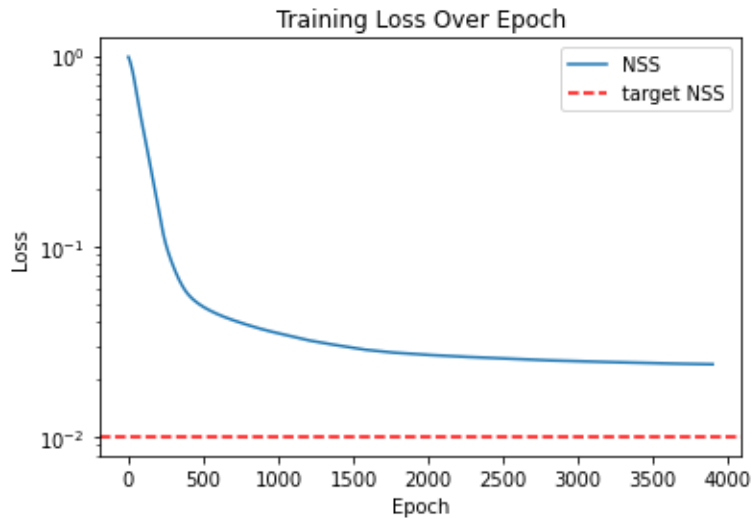
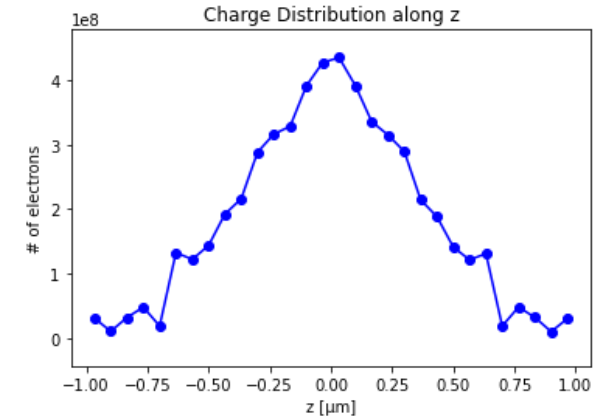
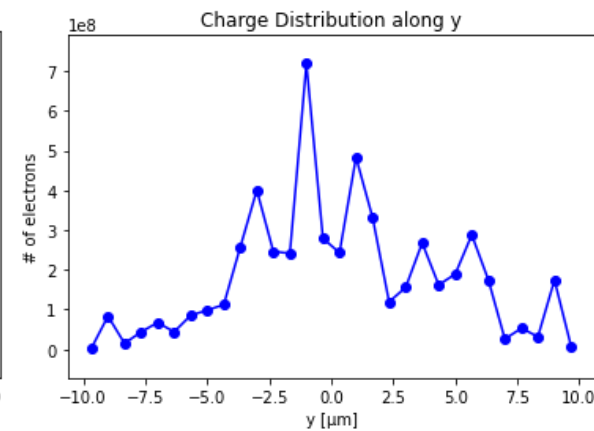
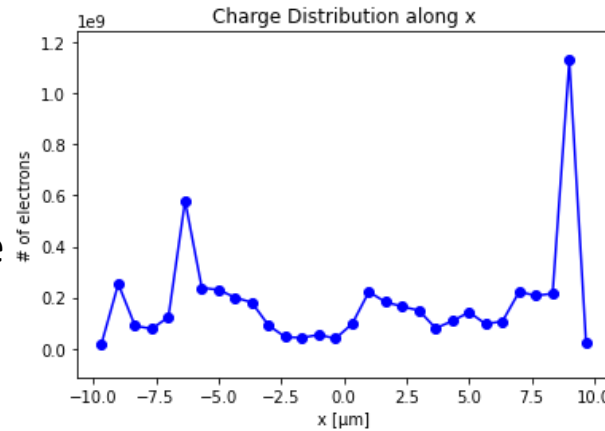
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Reconstructions with Penalty

Two penalty terms:

1. Boundary charge is zero
2. Prior knowledge on z -profile

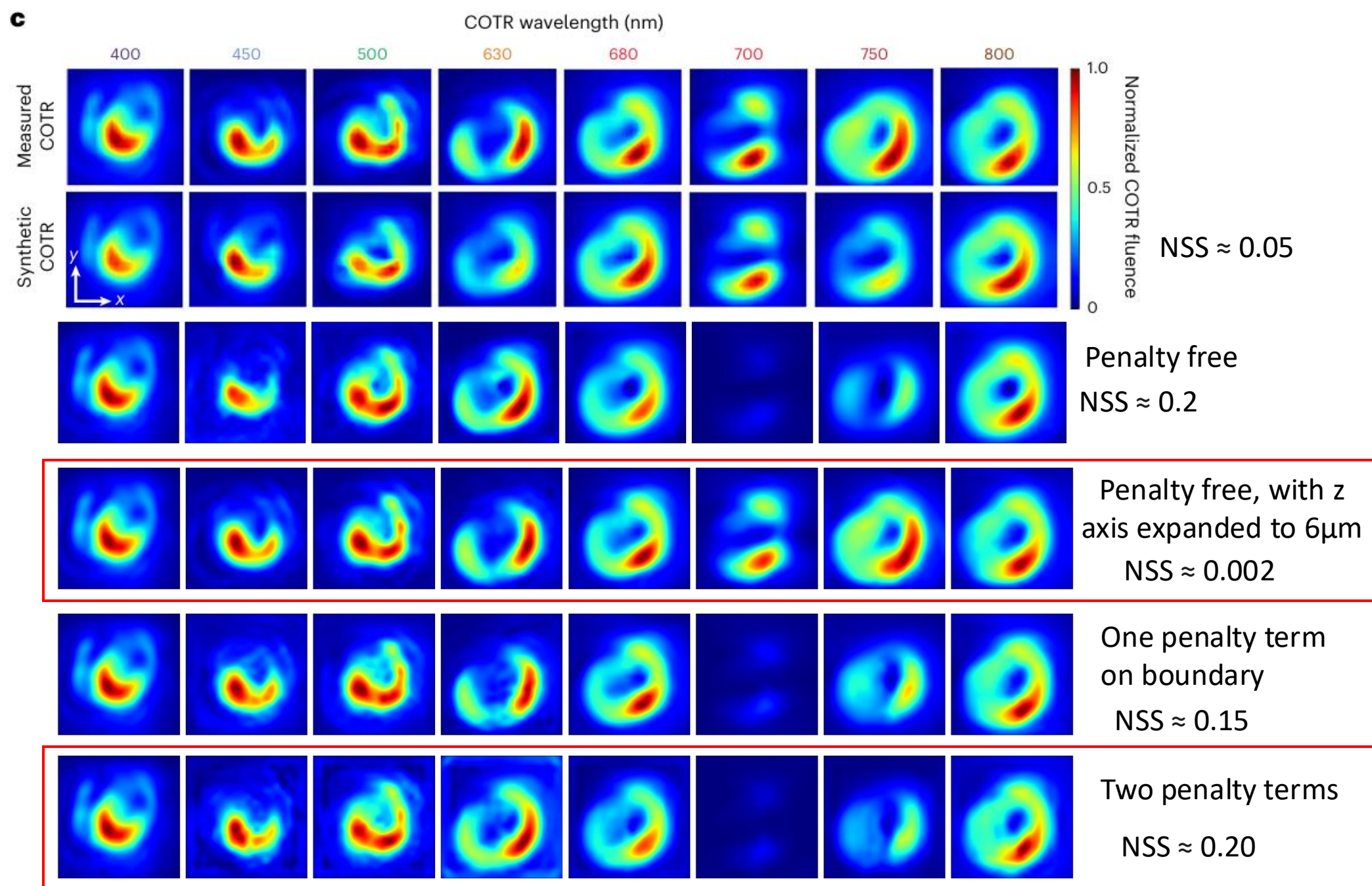
We should try to tune λ_1 and λ_2 to obtain lower NSS.



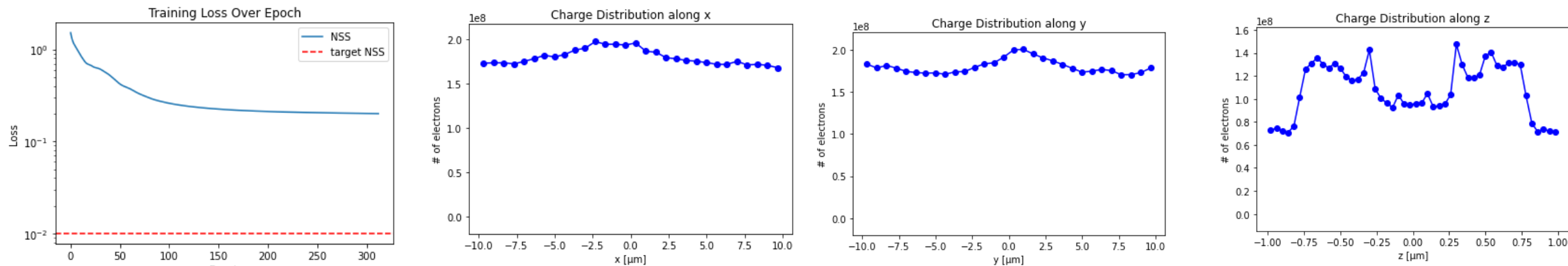
Recap on shot 228

We try to reconstruct this shot with gradient descent method with:

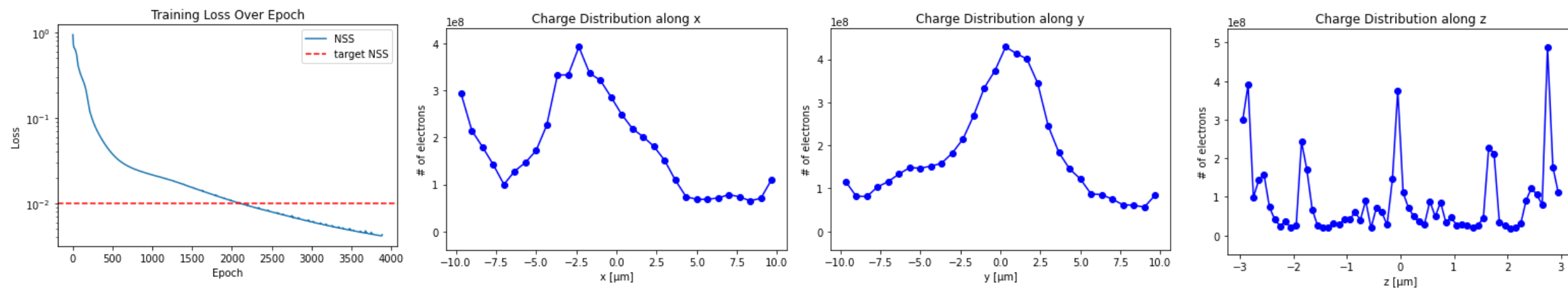
1. Free of constraints, in space $20\mu\text{m} \times 20\mu\text{m} \times 2\mu\text{m}$
2. Free of constraints, in space $20\mu\text{m} \times 20\mu\text{m} \times 6\mu\text{m}$
3. With condition that boundary charge is zero, in $20\mu\text{m} \times 20\mu\text{m} \times 2\mu\text{m}$ space
4. With condition that boundary charge is zero & known longitudinal profile, in $20\mu\text{m} \times 20\mu\text{m} \times 2\mu\text{m}$ space



Electrons profile

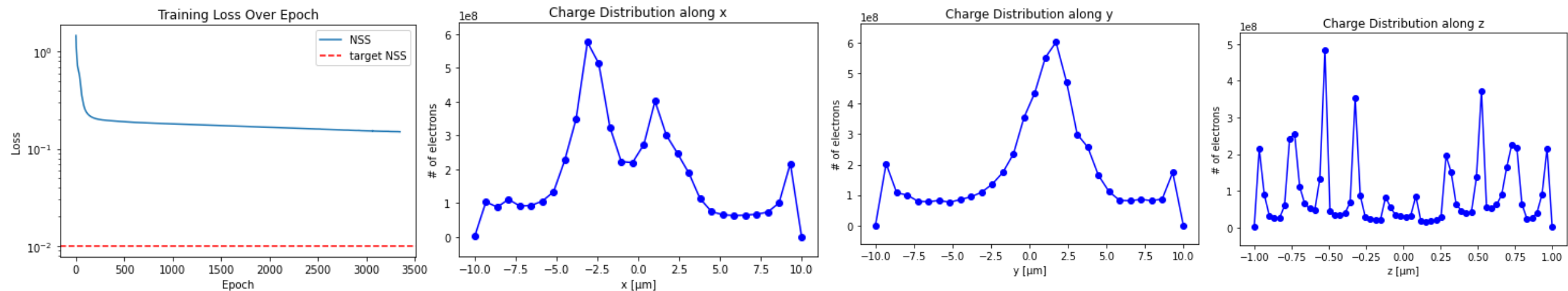


Penalty free

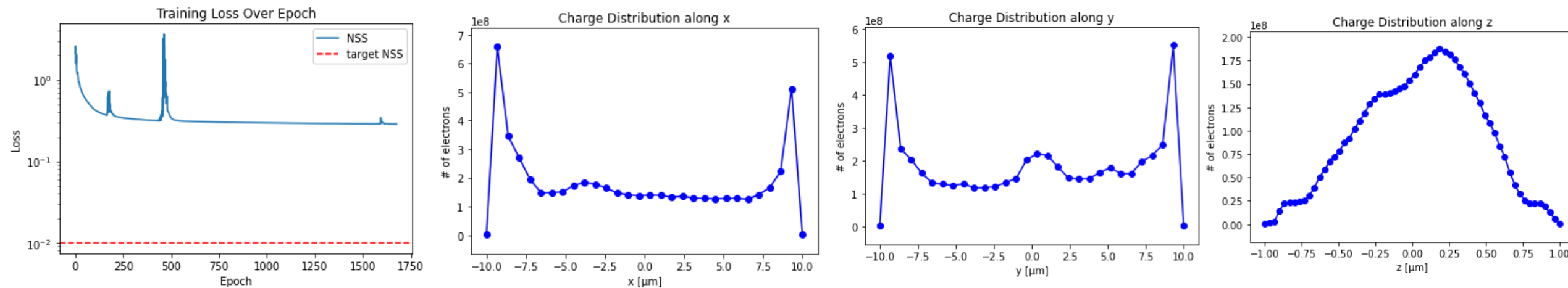


Penalty free, with z axis expanded to 6 μm

Electrons profile

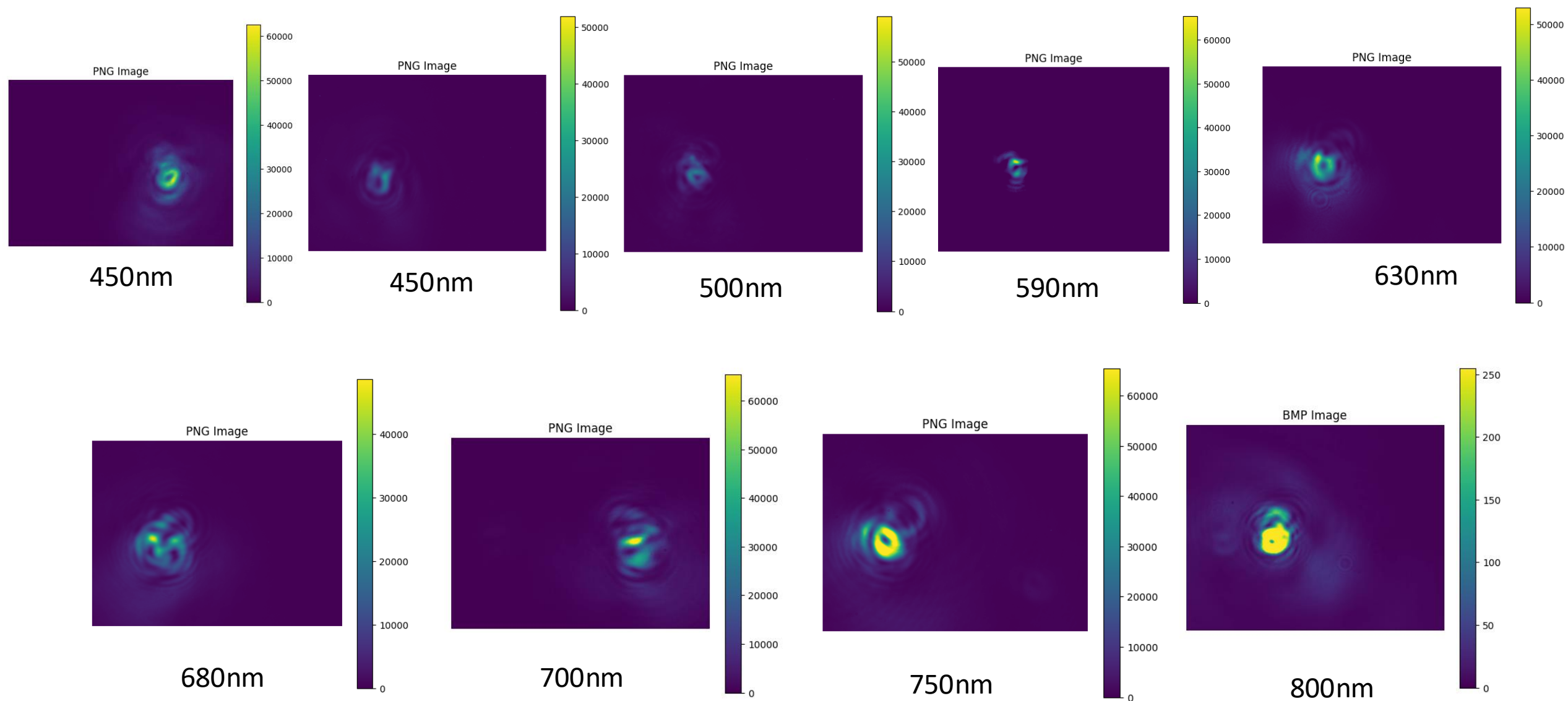


One penalty term on boundary



Two penalty terms

Self-injection data processing



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1. Each pixel stands for $\sim 0.1\mu\text{m}$
 2. BMP file saturates for 800nm?
 3. Down-ramp signal too weak