

Workshop summary

Nahuel Brito

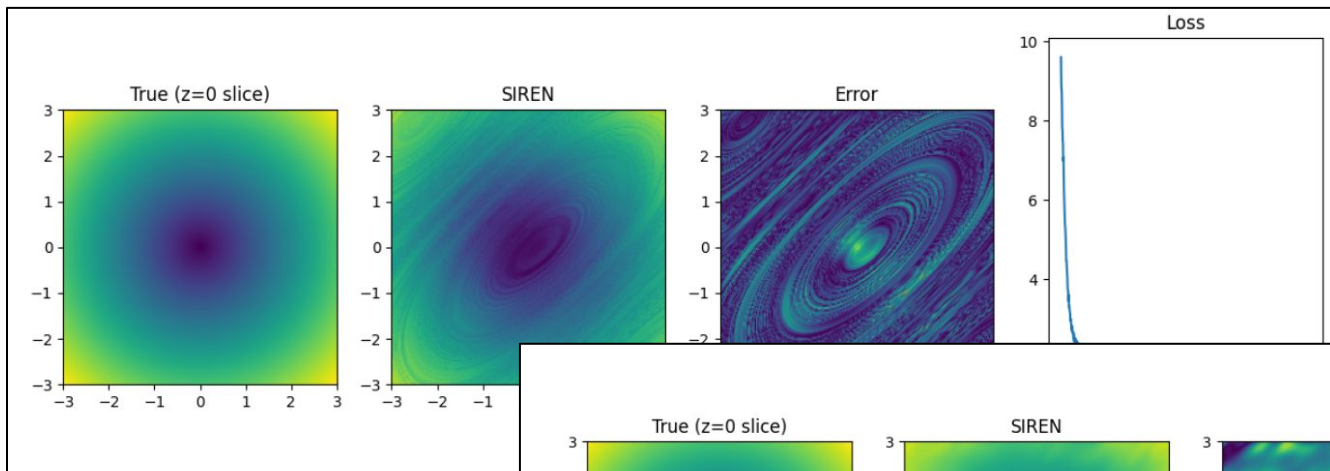
Objective

Train a SIREN to add a (r,z,ϕ) dependence for the water absorption in LUCiD

Intermediary steps:

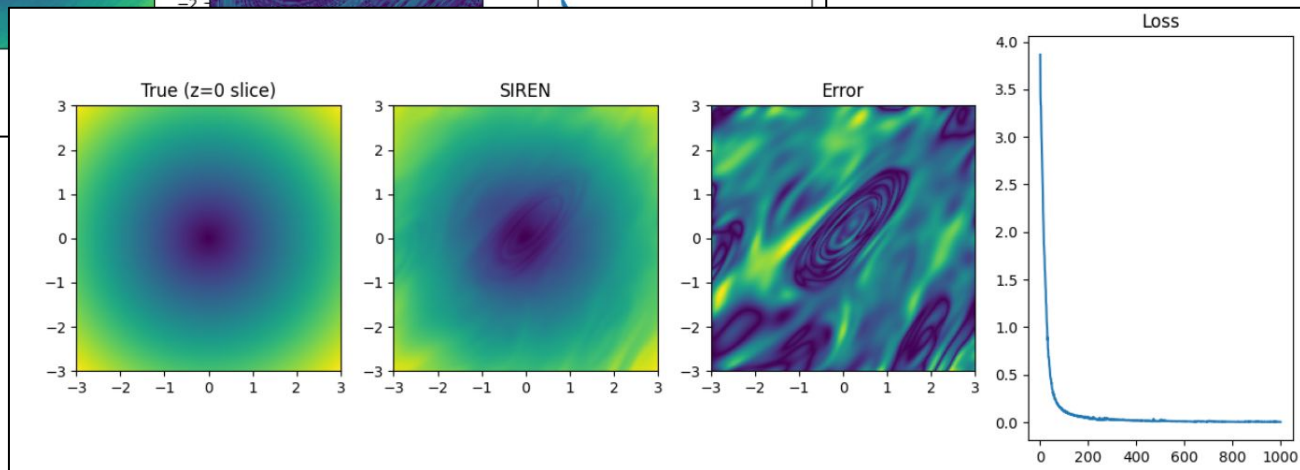
- Getting familiar with SIRENs
- Sampling random points on particular lines
- Sampling random points on random lines
- Sampling equally distant points on random lines using a loss of averages

Getting familiar with SIRENs / First trainings

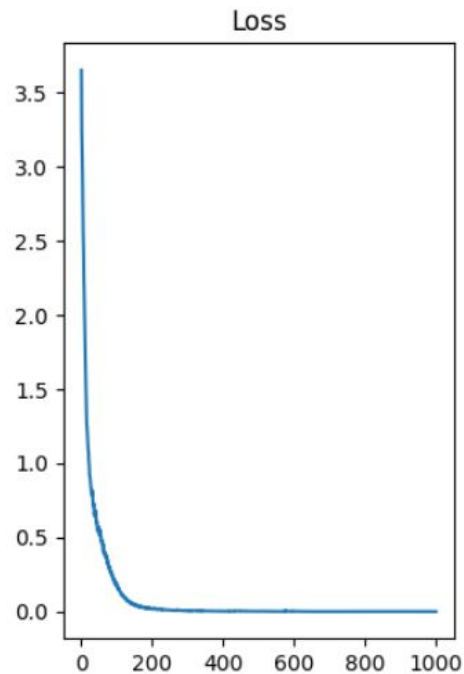
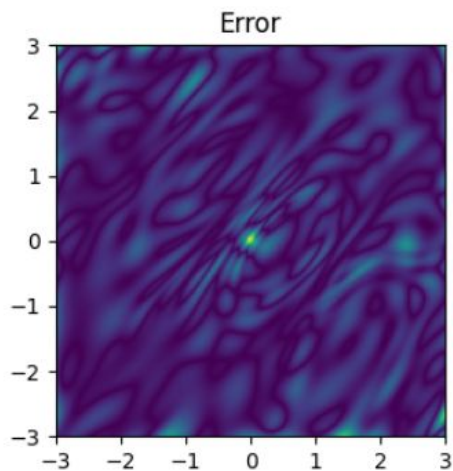
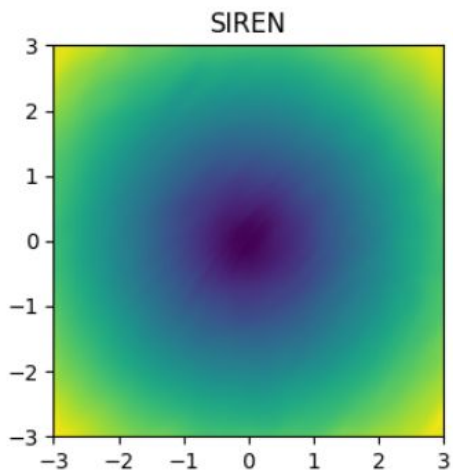
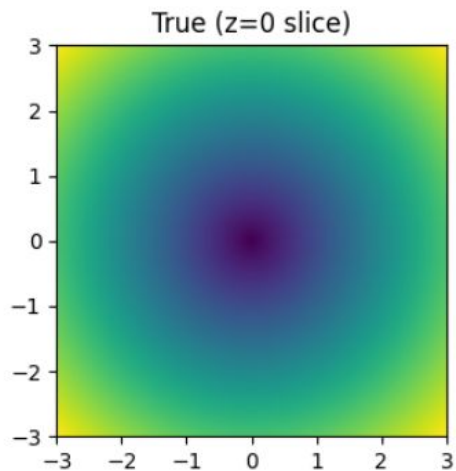


$$\lambda \rightarrow \lambda \times f(r, z)$$

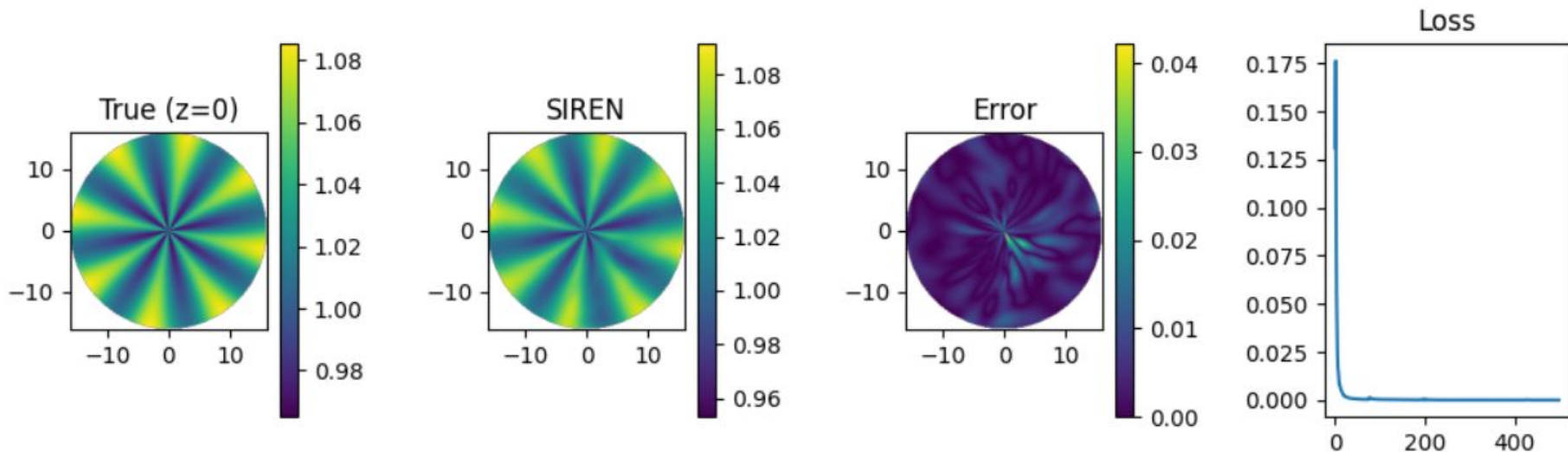
No particular geometry, just sampling over a simple box



Getting familiar with SIRENs / First trainings



Getting familiar with SIRENs / adding the real geometry + a more complicated target function

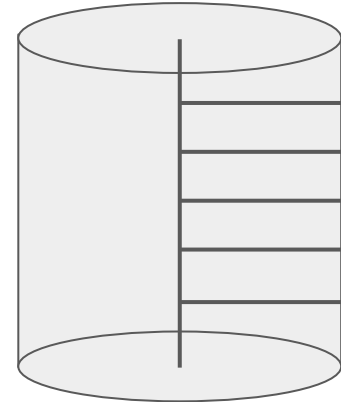
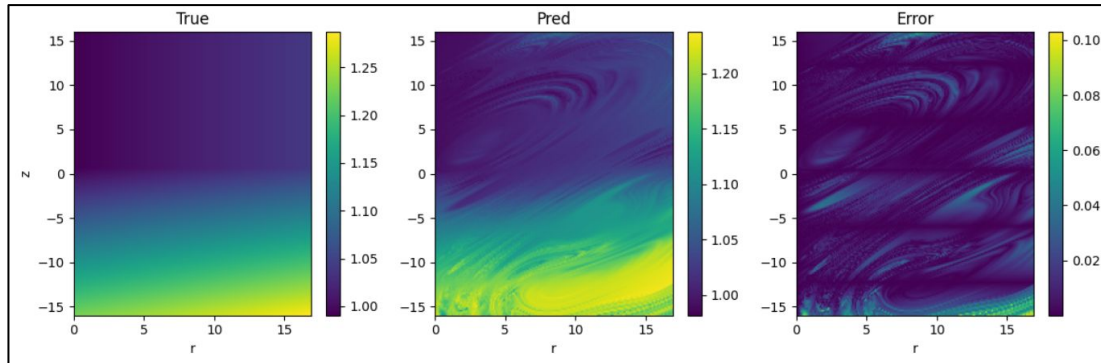
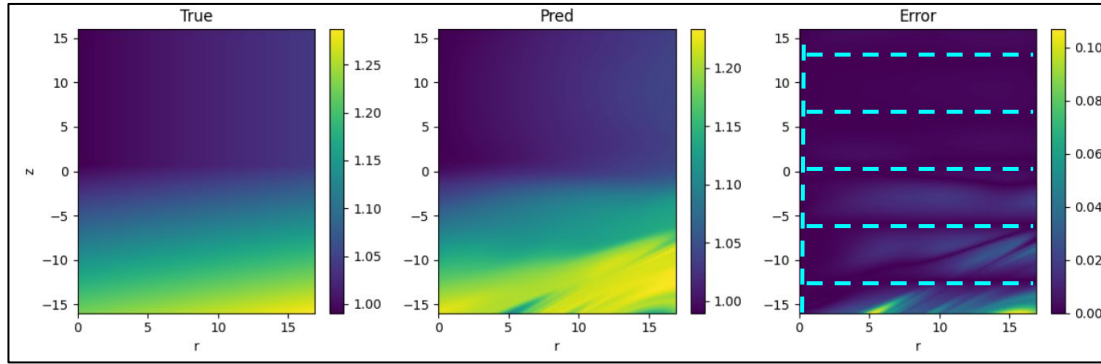


$$f(x, y, z) = z_{dependence}(z) \times r_{dependence}(x, y) \times S(x, y)$$

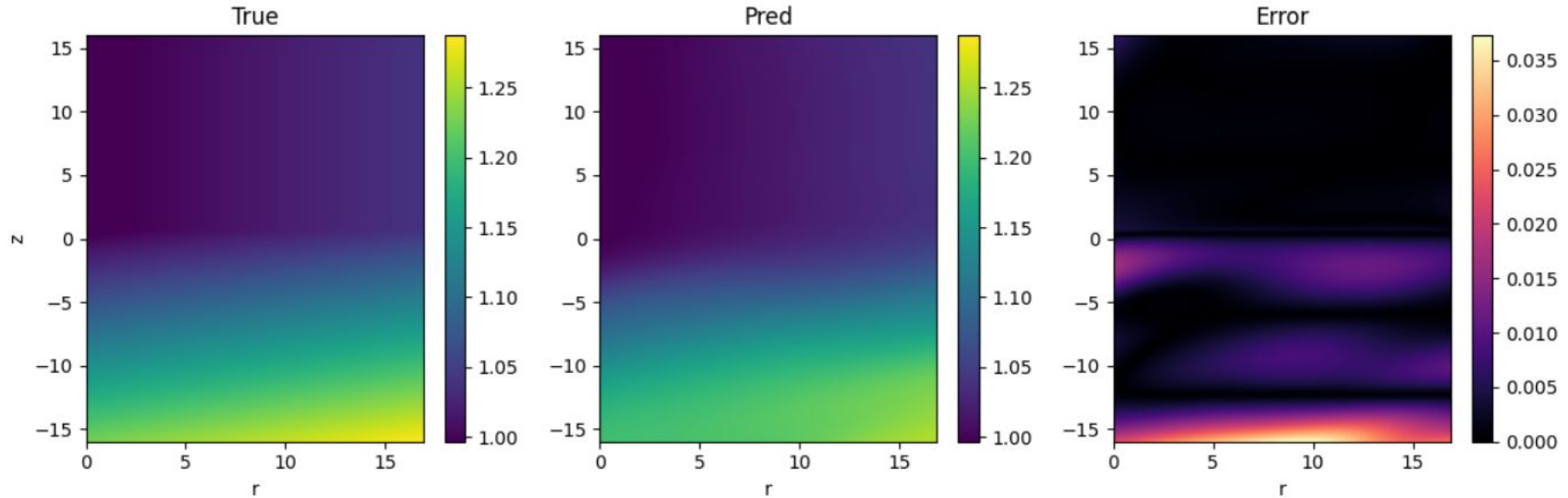


$$f(r, \theta, z) = z_{dependence}(z) \times r_{dependence}(r) \times S(\theta)$$

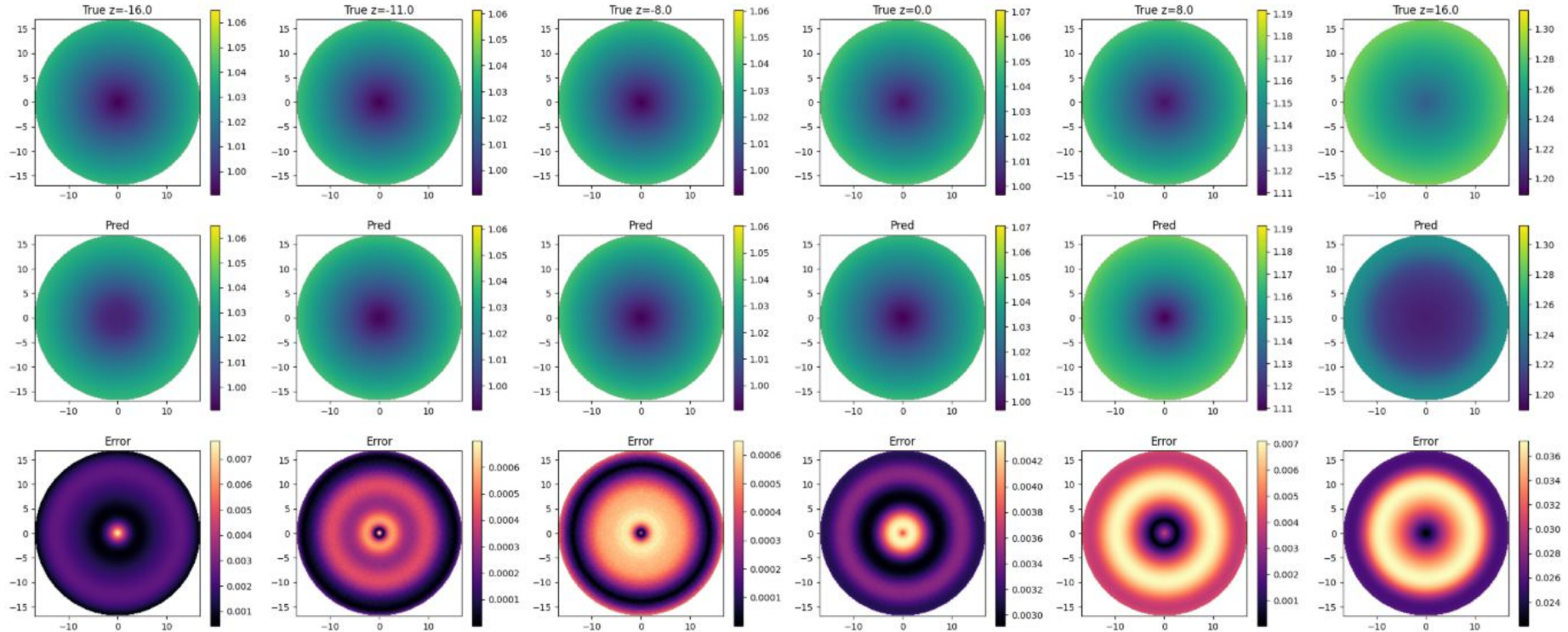
Sampling random points on particular lines / 2D



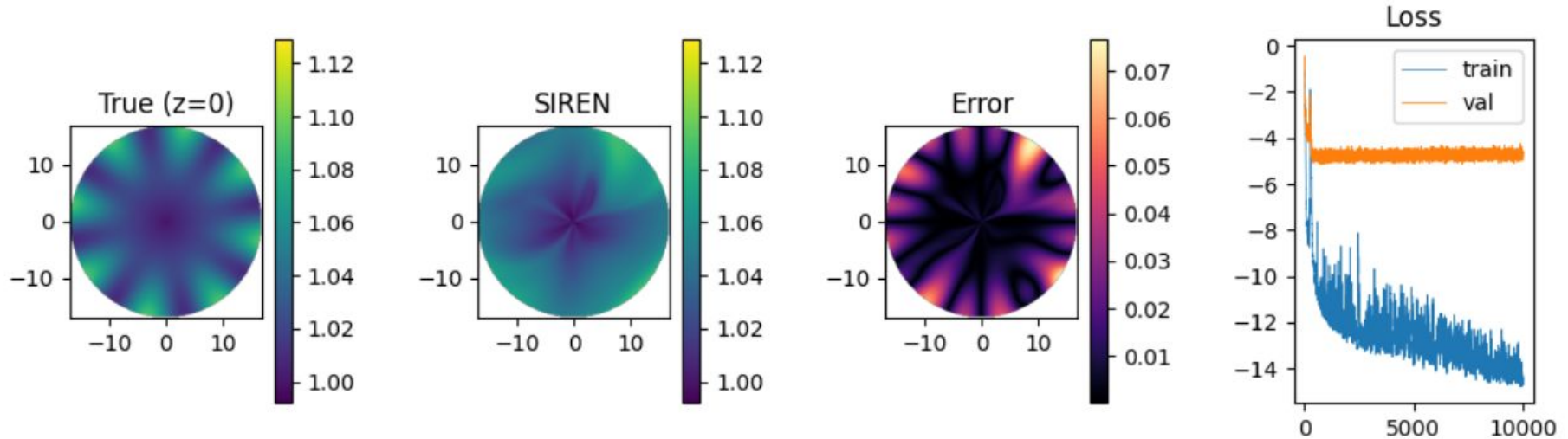
Sampling random points on particular lines / 2D



Sampling random points on particular lines / 2D

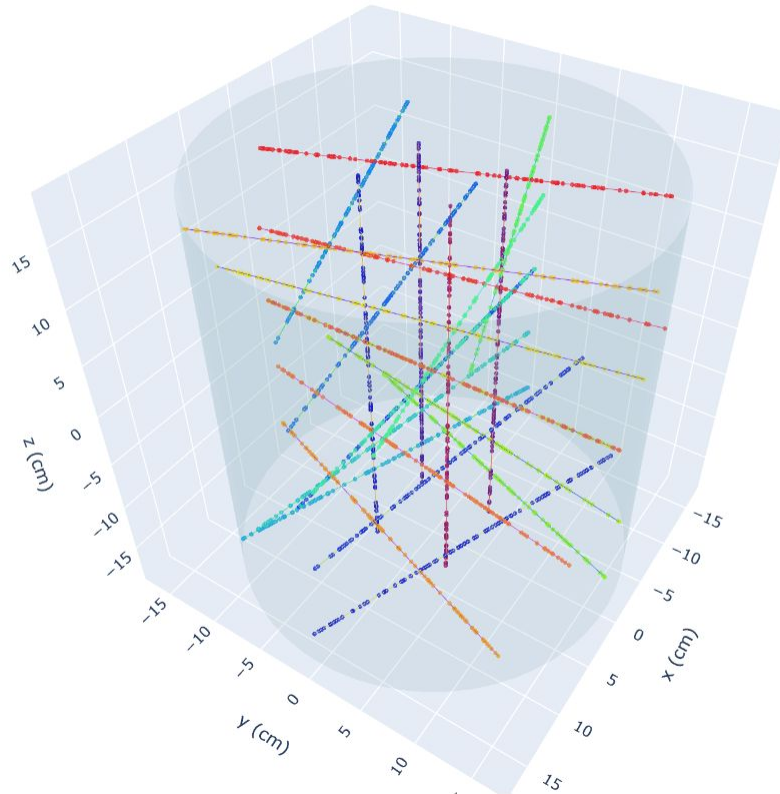


Sampling random points on particular lines / 3D



We changed the function to lower the phi contribution around the center

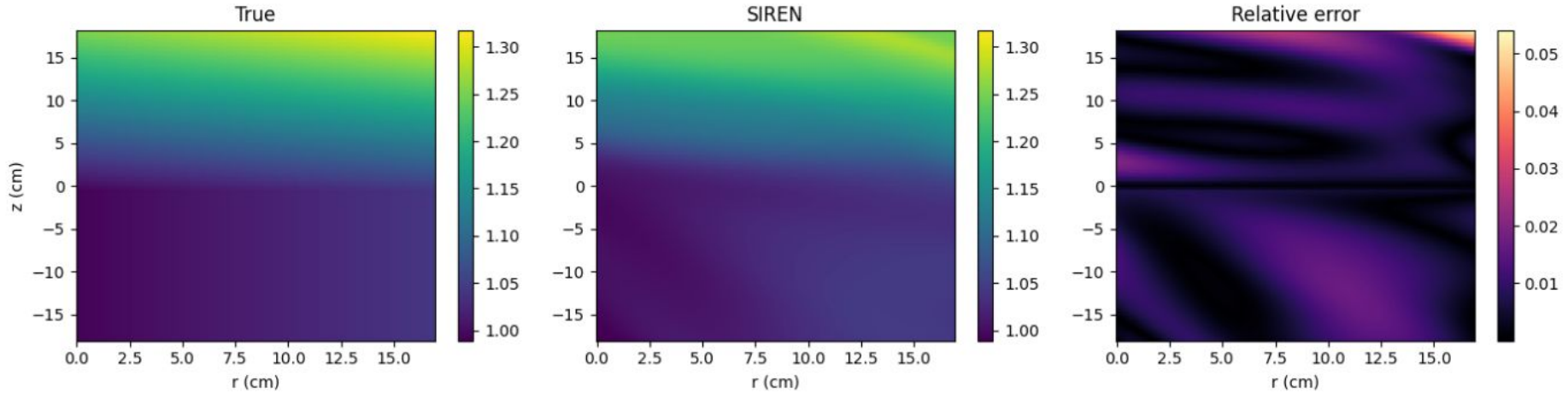
Sampling random points on particular lines / 3D



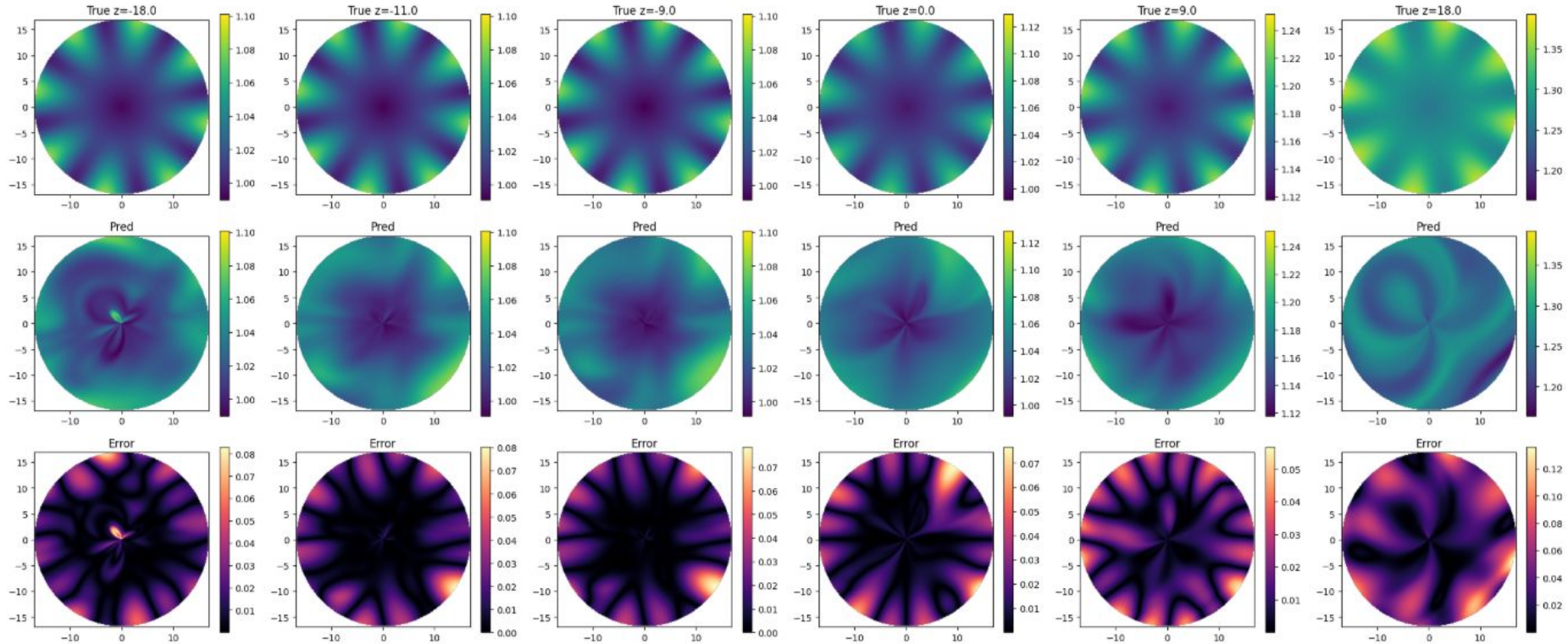
$\pi/9$
maximum
offset

Sampling random points on particular lines / 3D

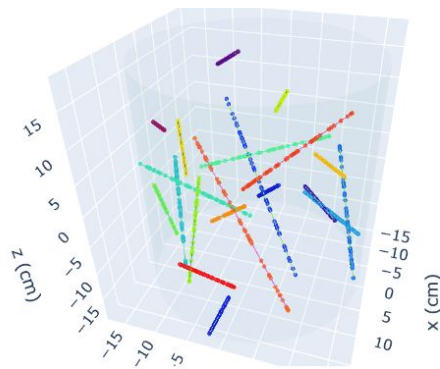
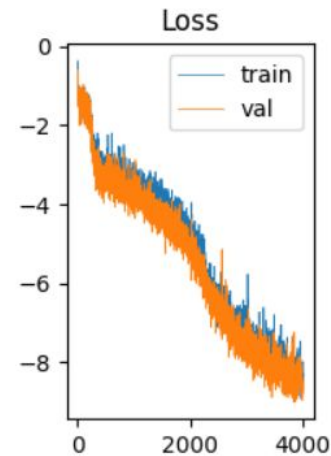
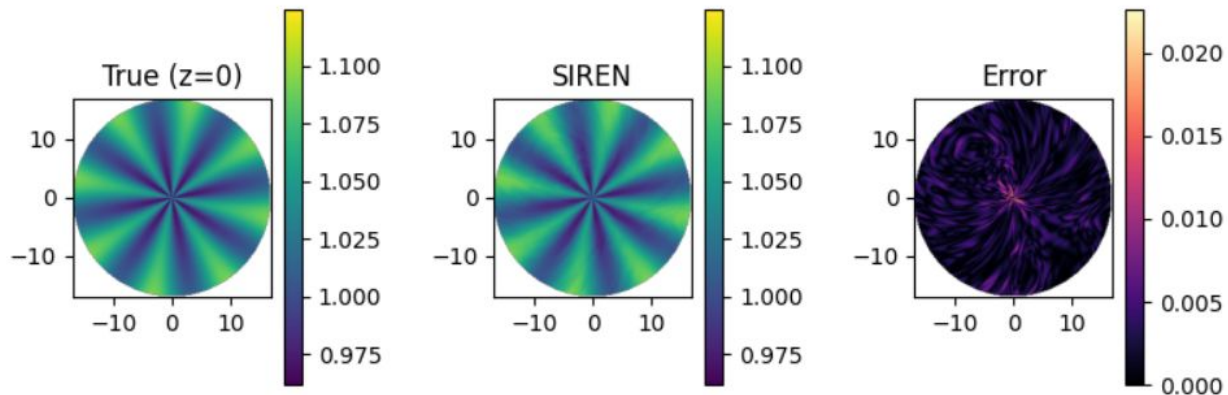
r-z heatmap at $\theta = 0.00$ rad



Sampling random points on particular lines / 3D

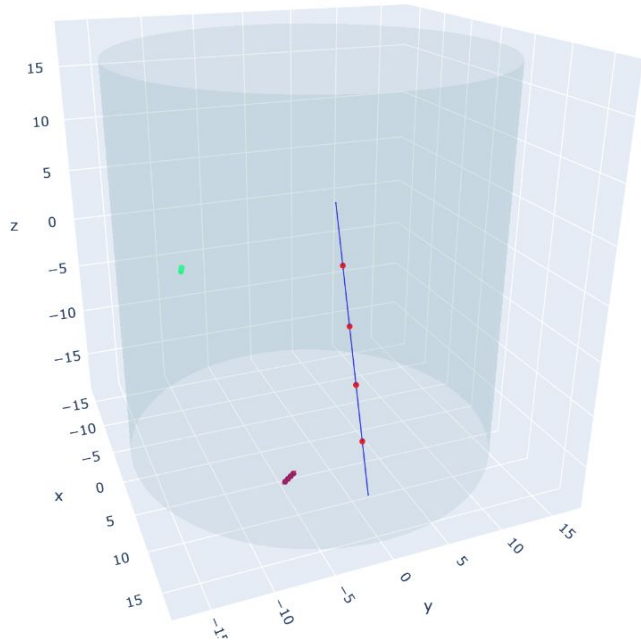


Sampling random points on random lines



Putting the SIREN into LUCiD

Step 1: sampling equally distant points on random lines



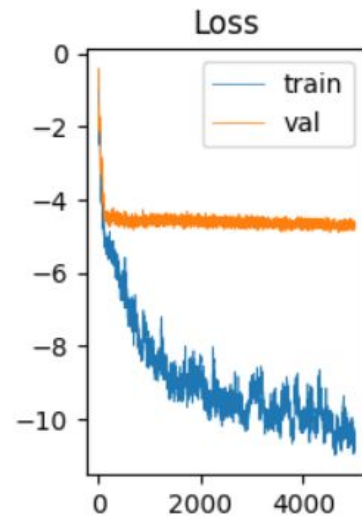
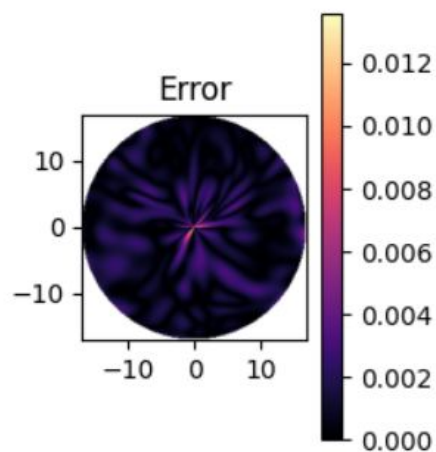
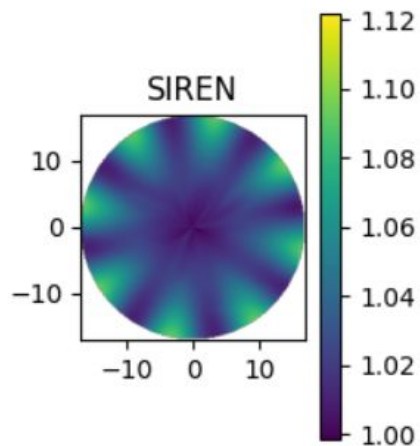
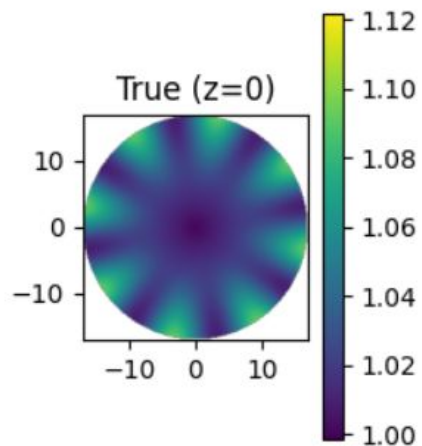
Step 2: changing the loss

MSE of the predicted points with respect to the true values

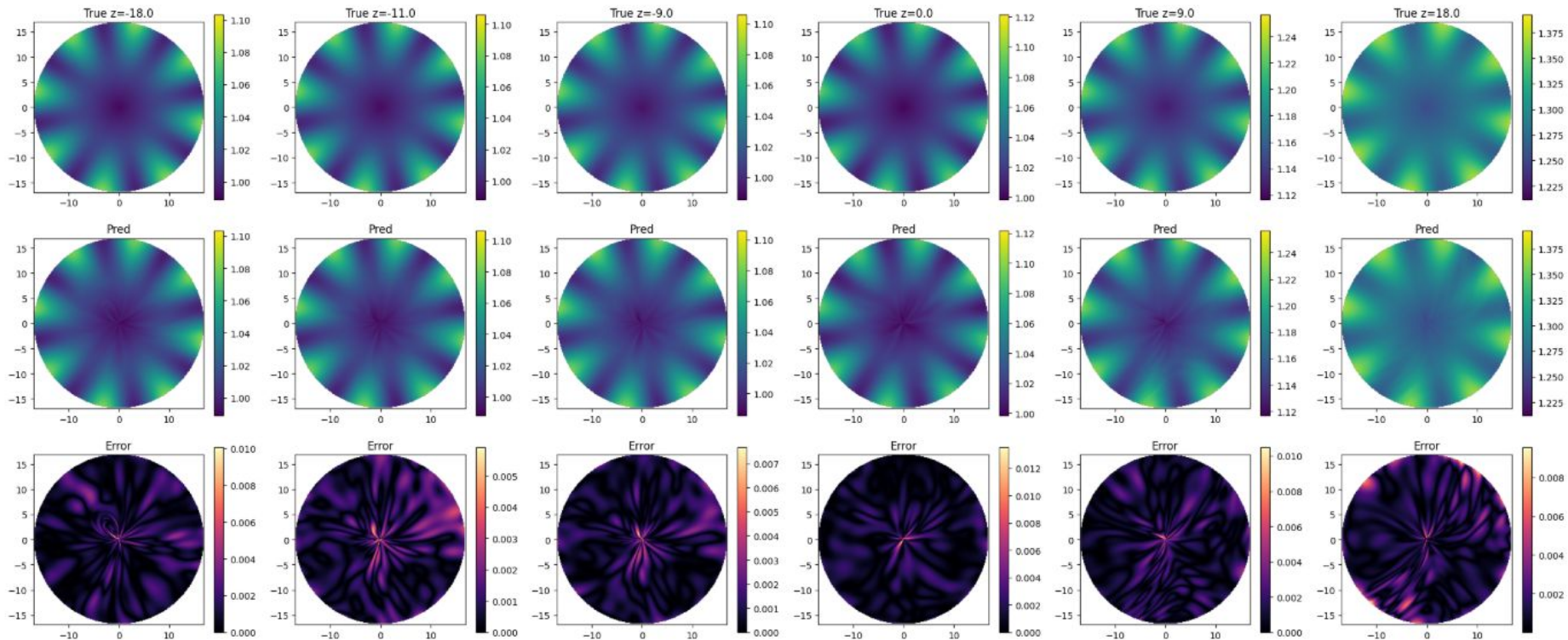


MSE of the average absorption along each lines with respect to the true averages

Putting the SIREN into LUCiD



Putting the SIREN into LUCiD



Putting the SIREN into LUCiD

r-z heatmap at $\theta = 1.57$ rad

