Simulated Atom Cloud Reconstructions

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January 23, 2023

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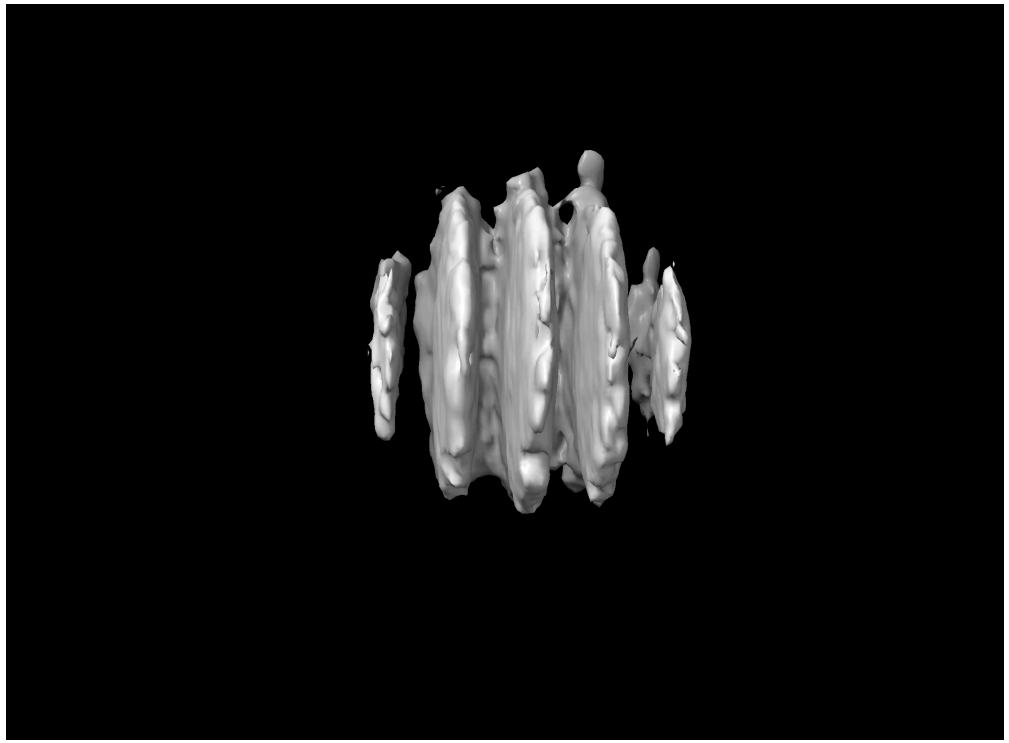
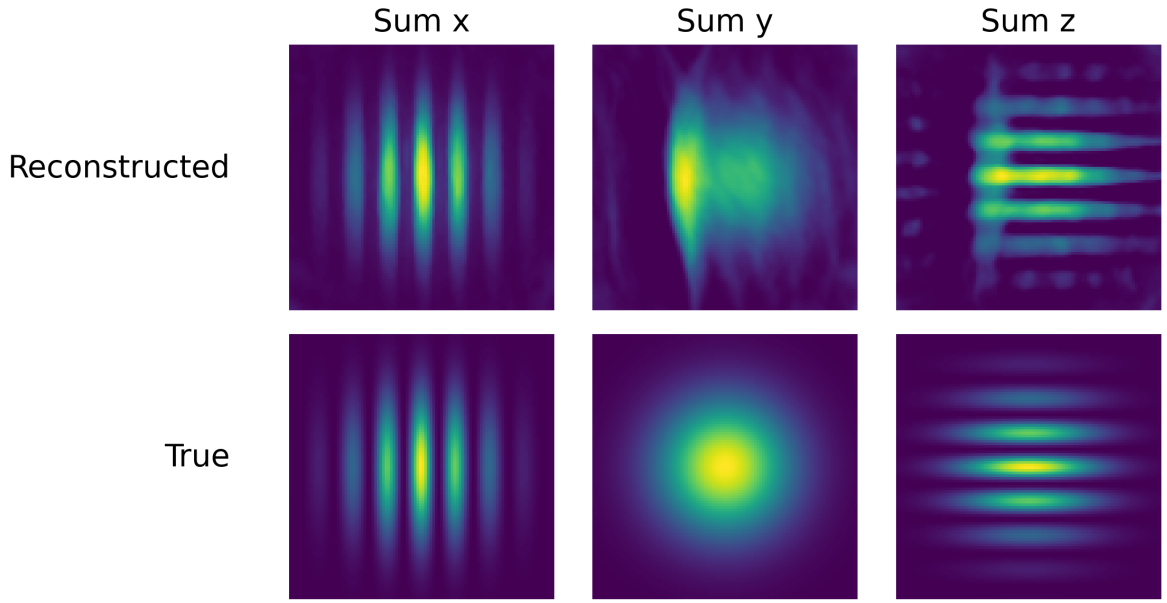
Recall: Previous results for m=0.1 dome, SIREN

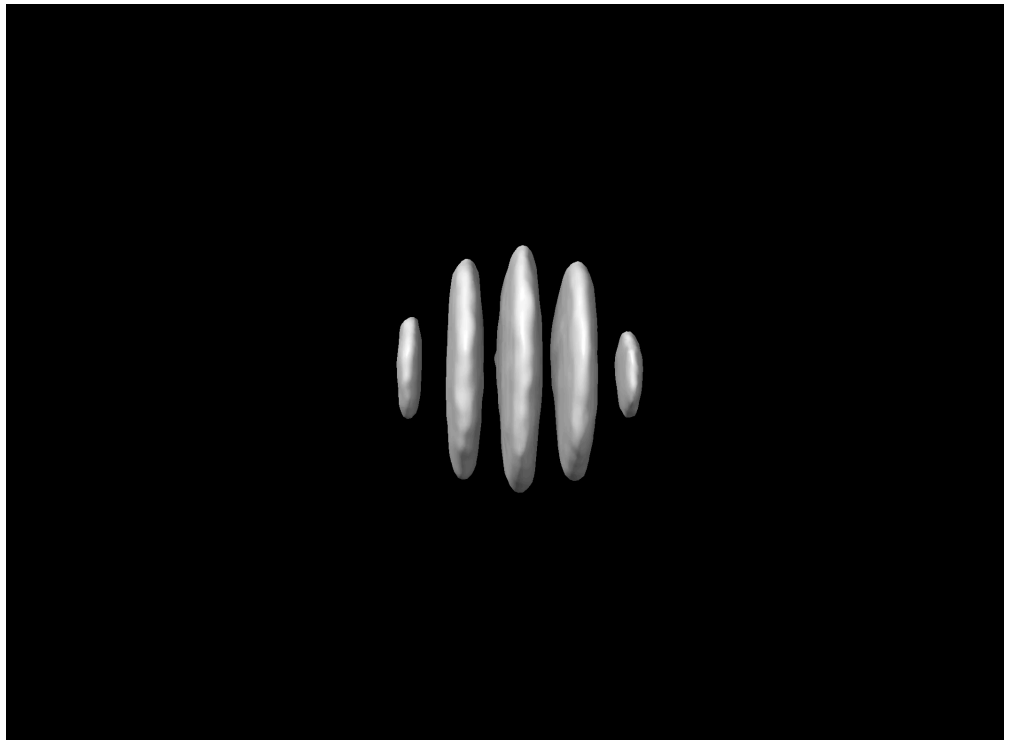


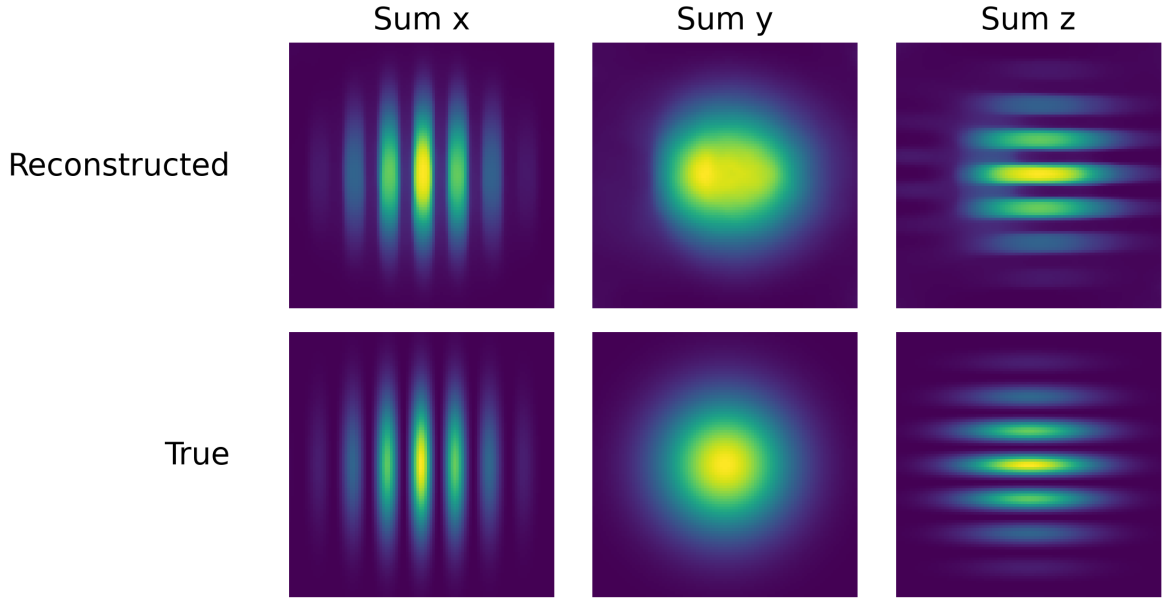


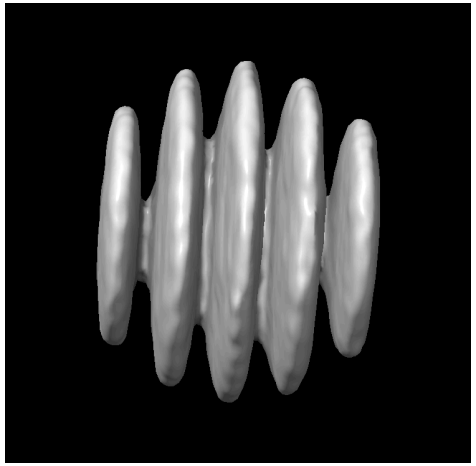
Because of limited angular coverage, back of atom cloud is not well reconstructed

- Second peak along x-direction, density between fringes
- To improve: likely need some priors (regularization) and/or more information

m=0.1 Dome, Gradient Regularization, SIREN



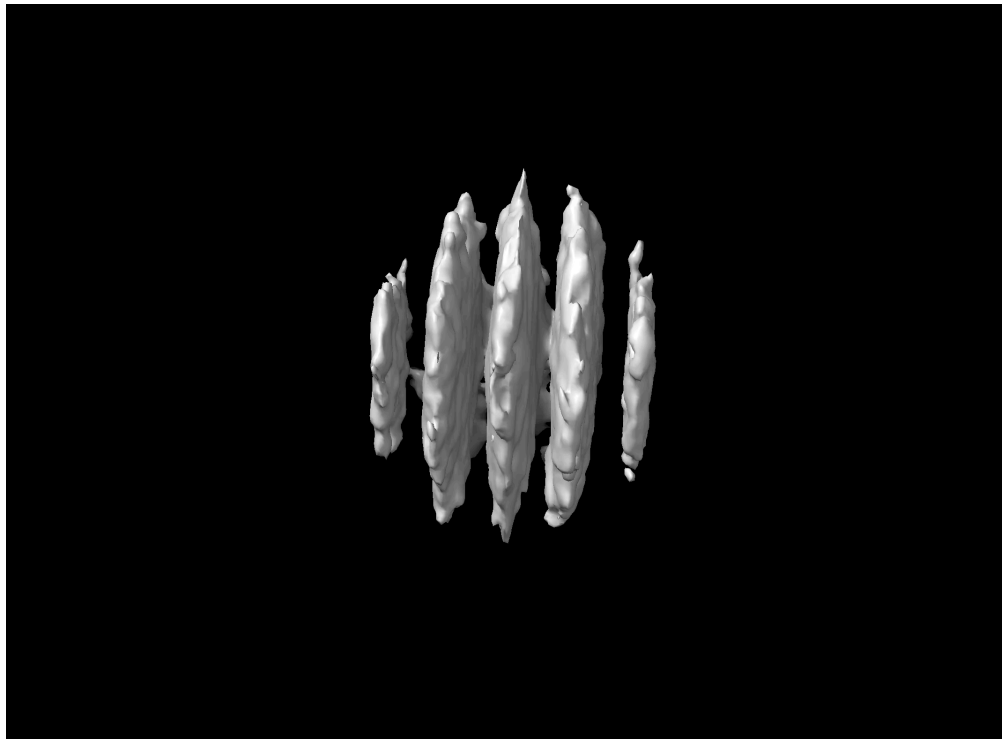


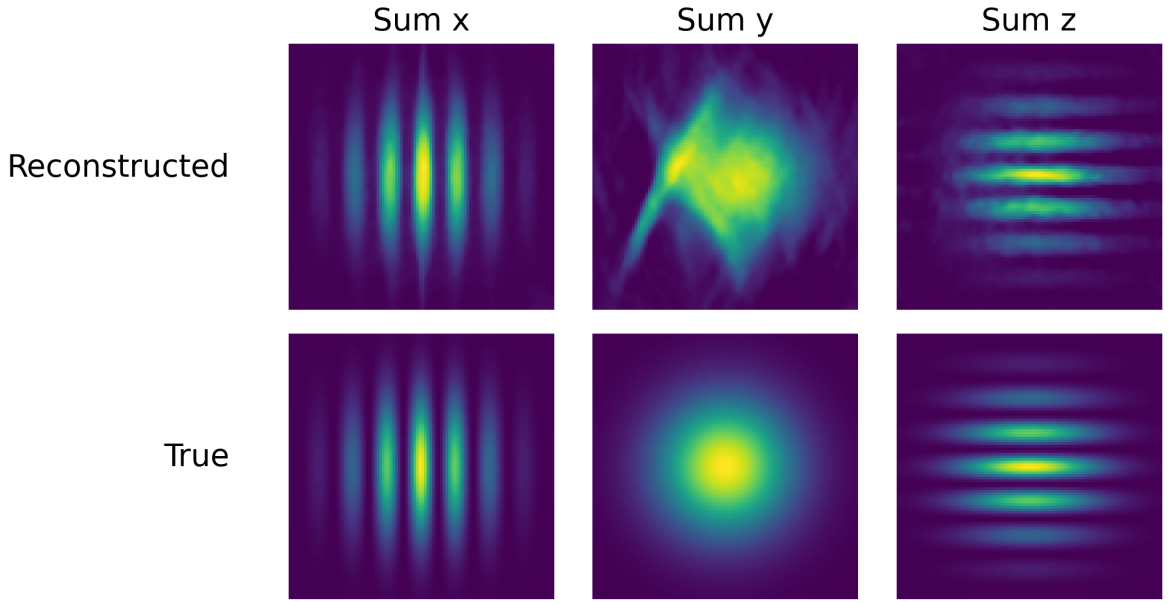


Use gradient information from SIREN to encourage smoothly varying density

- ~Total variation loss (but need to cross check that equations are actually the same)
- Still some artifacts, but results in more Gaussian shape
- Note: tradeoff between smoothness/ resolution

m=0.1 Dome, more information: Top Camera (WIP)

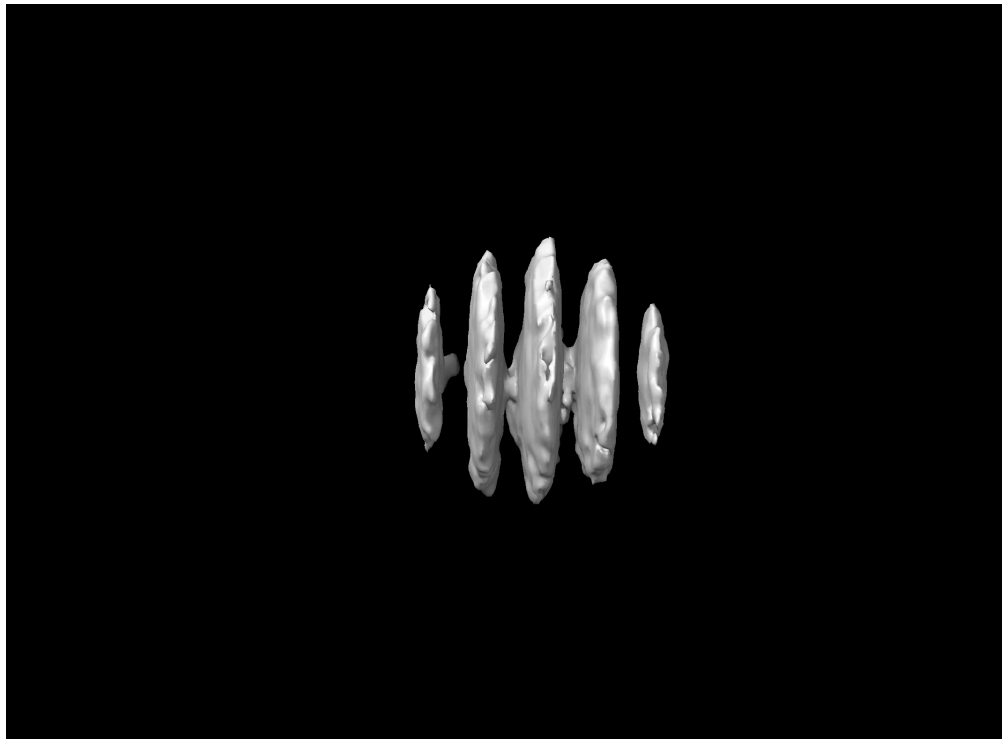


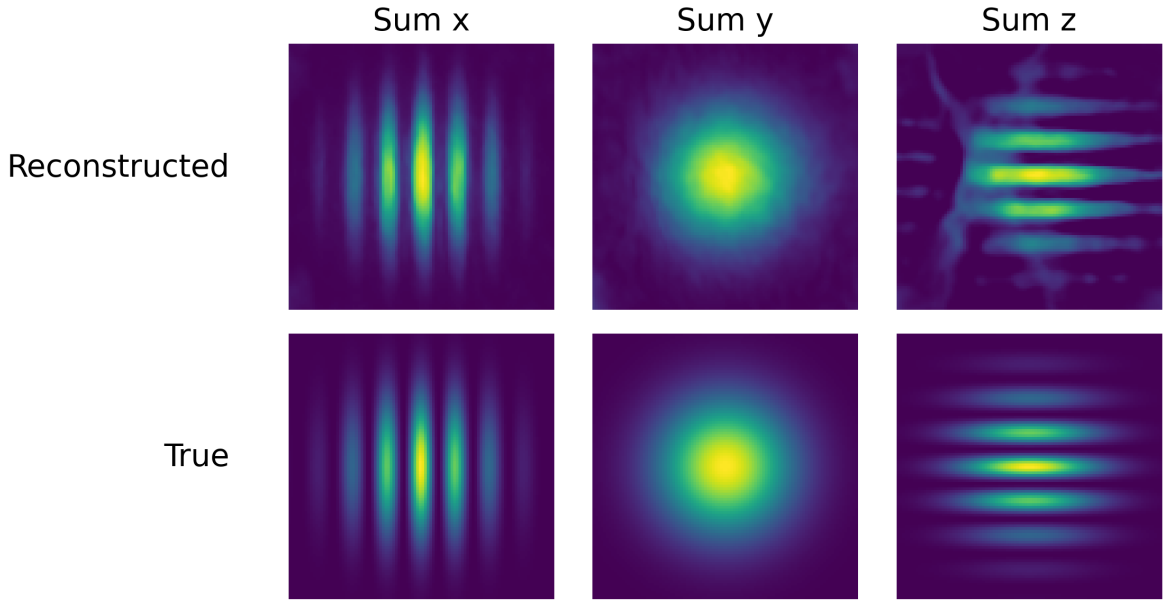


Add a image from camera “on top” of the system

- Pointing down at the cloud along the z-axis
- Note: result here does **not** include regularization from previous slide
- As expected, view from top much improved, still artifacts from back, side view

m=0.1 Dome, more information: Side Camera (WIP)





Add a image from camera “to the side” of the system

- Pointing towards the cloud along the y-axis
- Note: result here does **not** include regularization from previous slide
- As expected, view from side much improved, still artifacts from back, top view

Conclusions

A few tools in the toolbox to significantly help the reconstruction

- Gradient regularization improves structure significantly, at the cost of resolution
- More information (additional camera) will certainly help!
- A few other ideas (improved sampling, etc)