Generative Adversarial Networks for Cosmology Mass Maps
(Simulation Emulation)

Mustafa Mustafa

Berkeley Lab.
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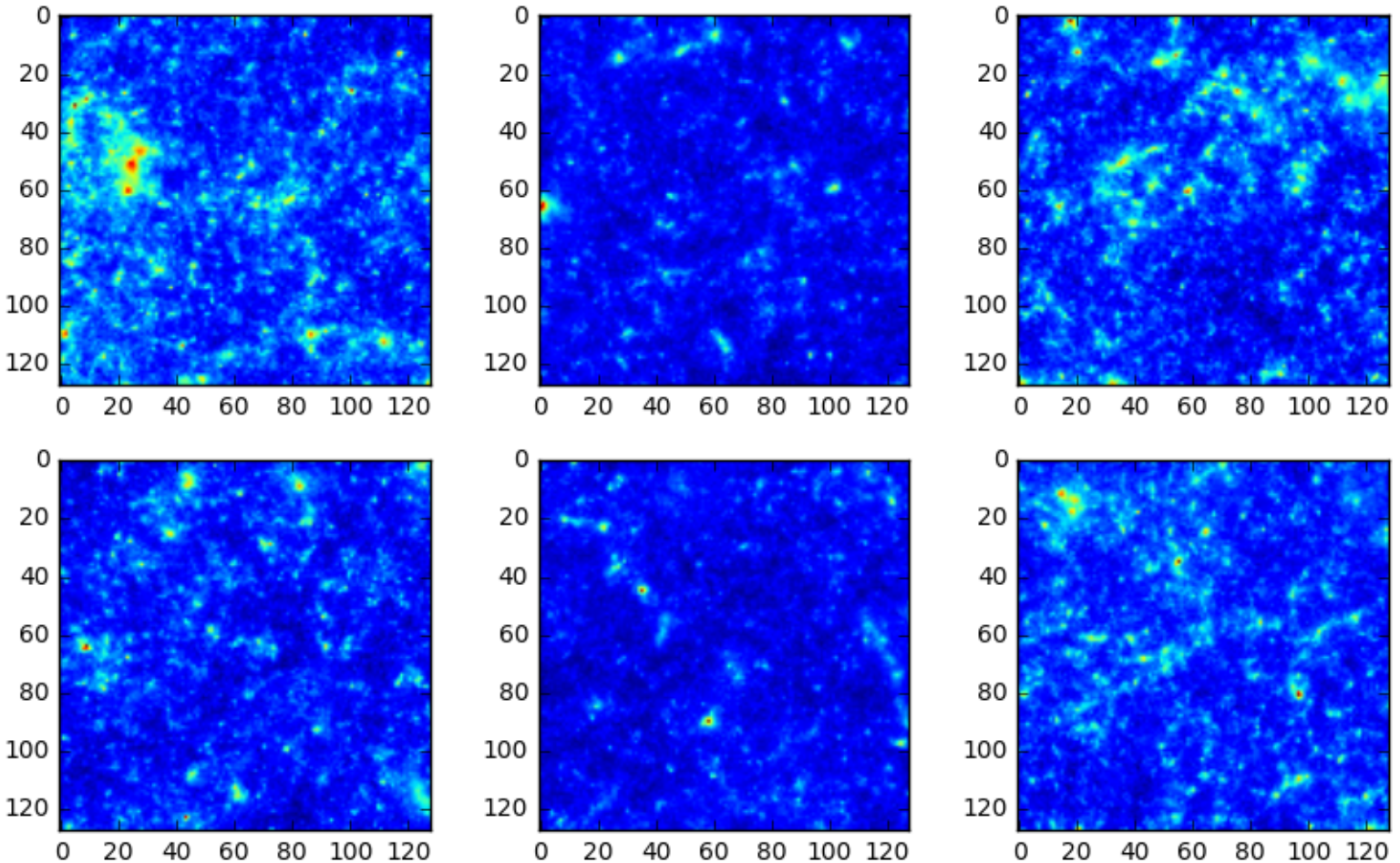
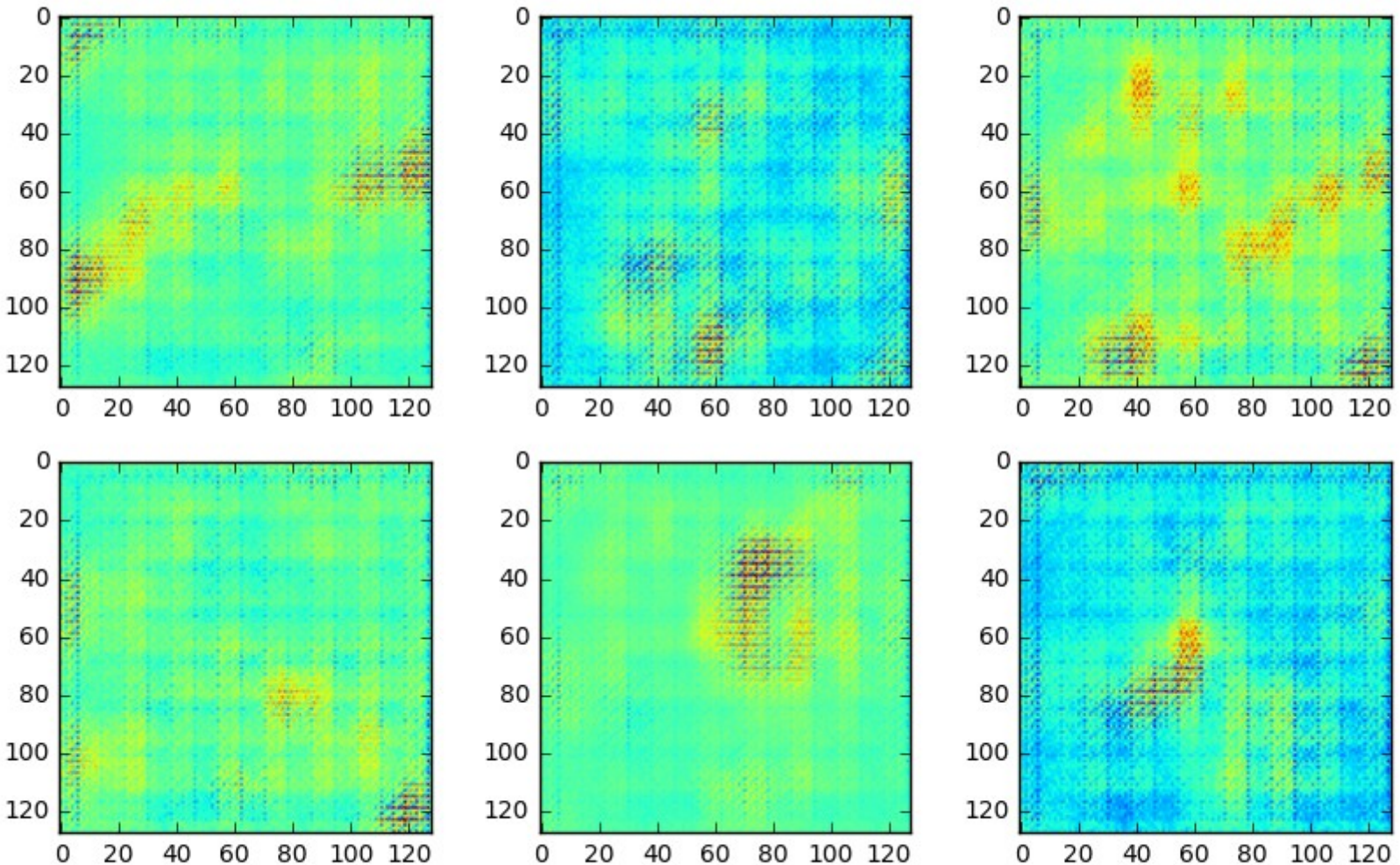
Cosmo DCGAN 128x128



Cosmo DCGAN 128x128



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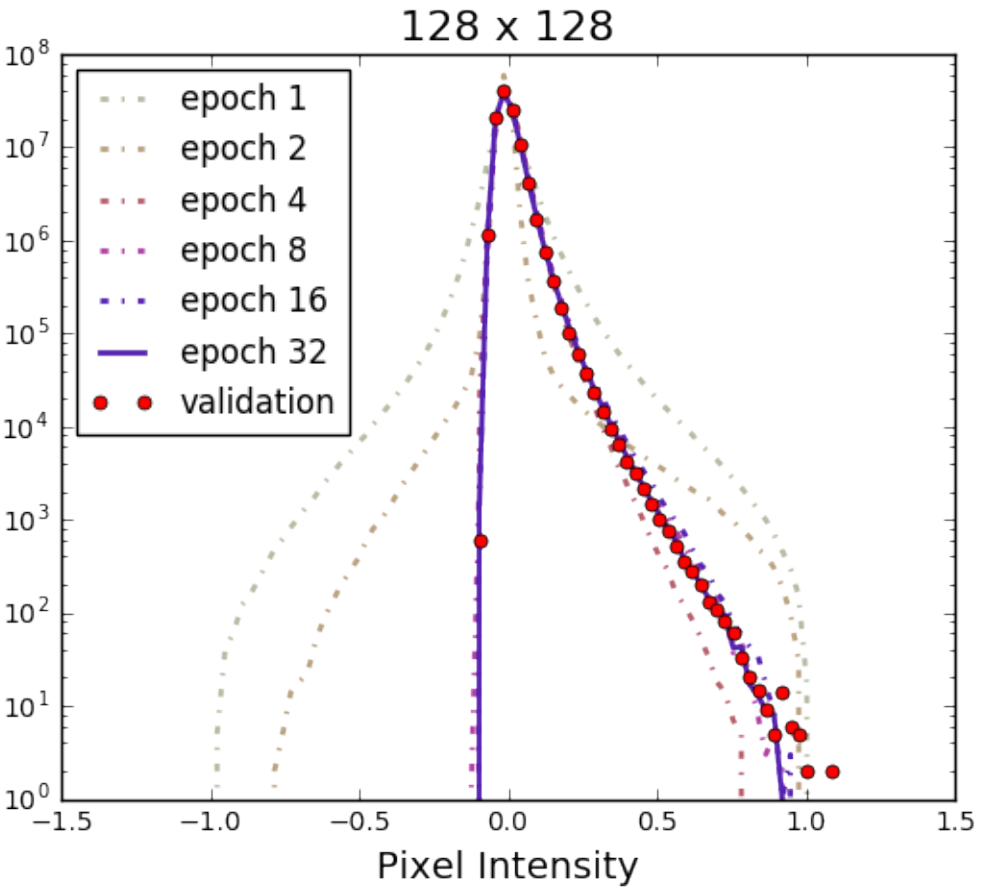

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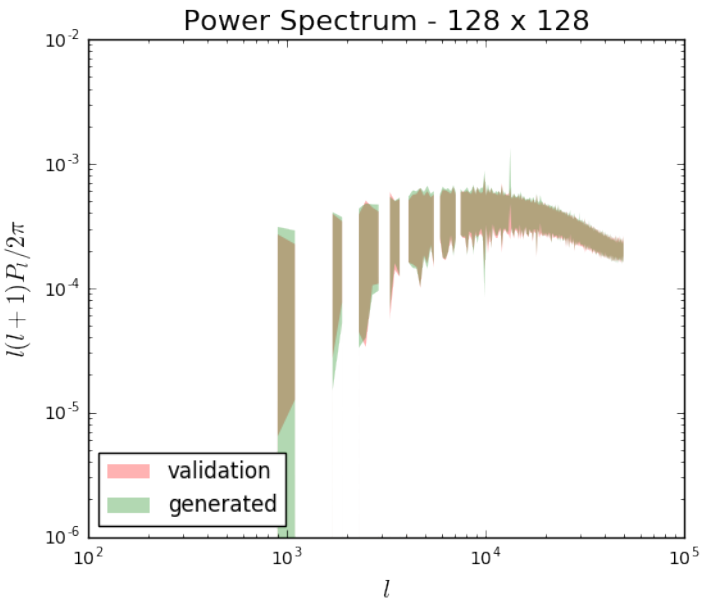

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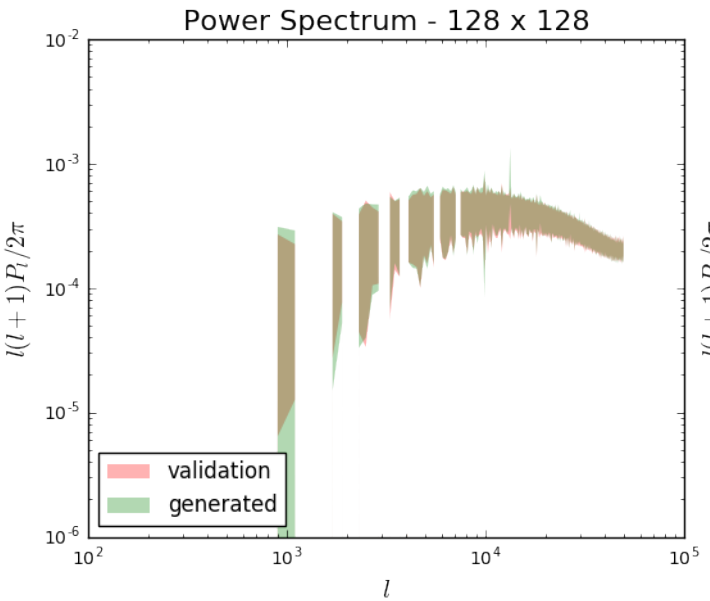

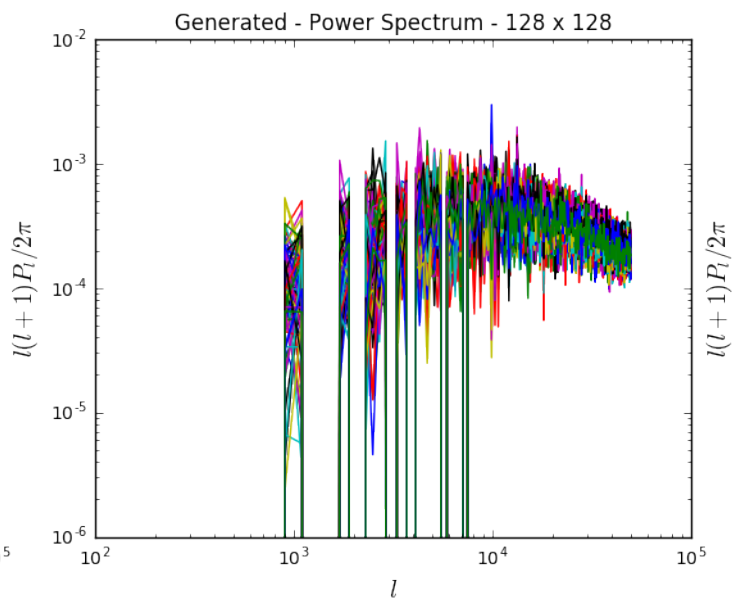

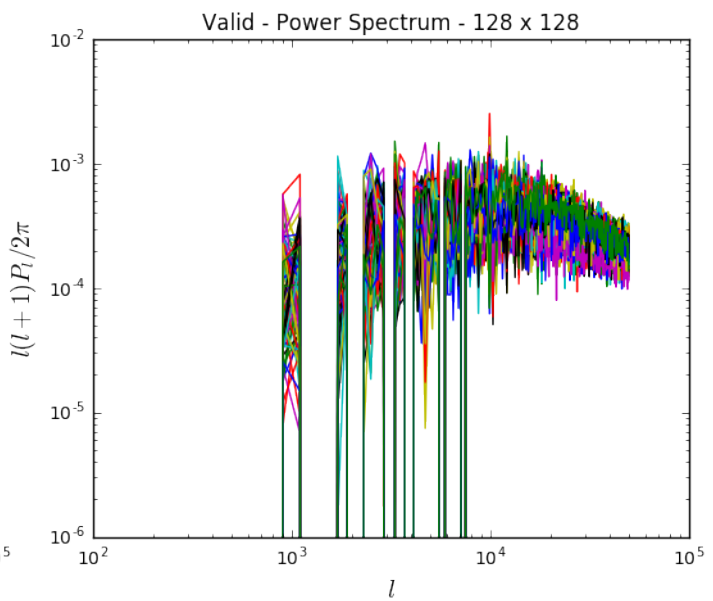

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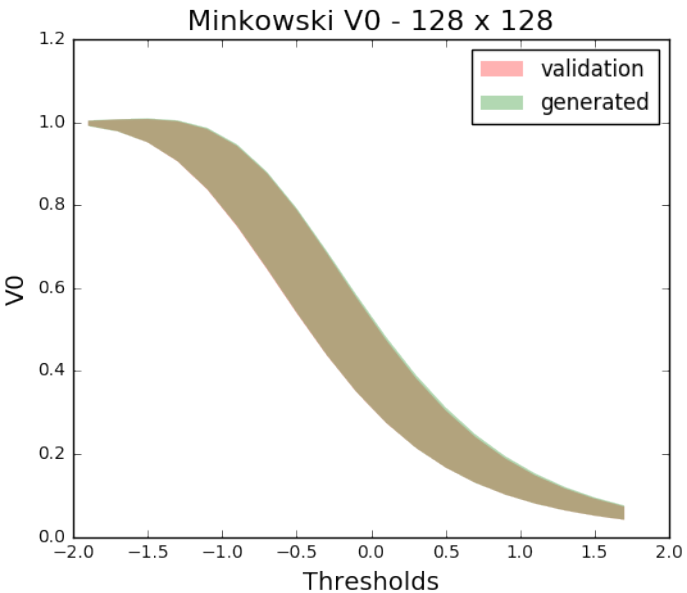
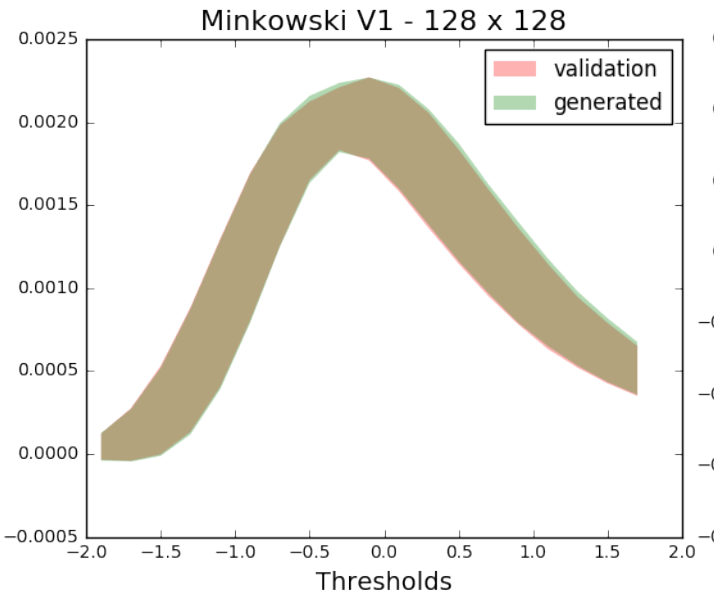
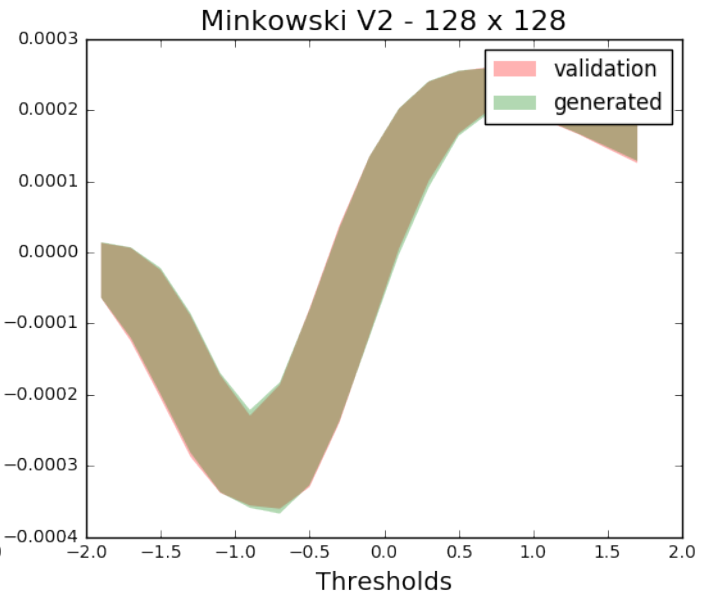
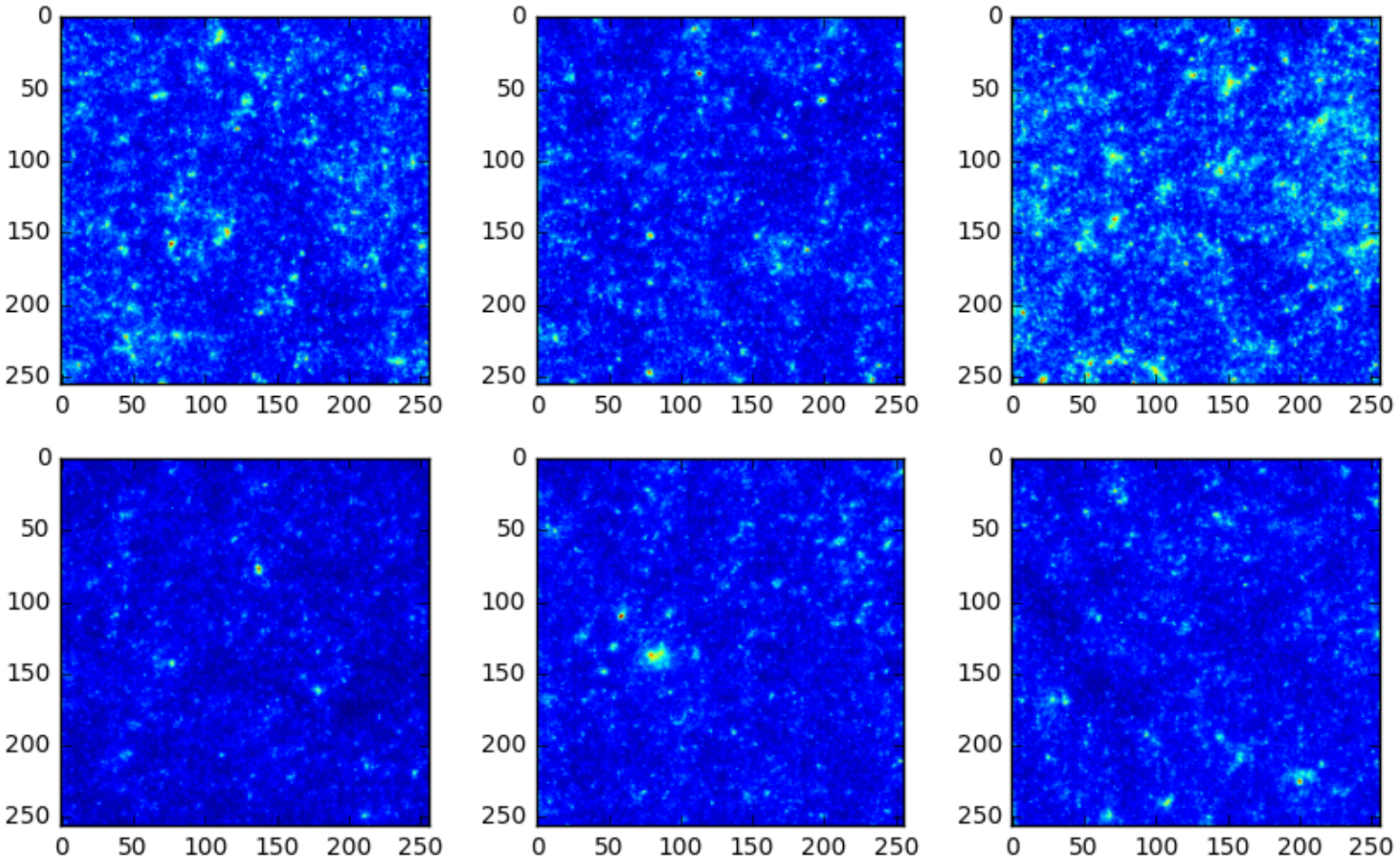






Cosmo DCGAN 256x256



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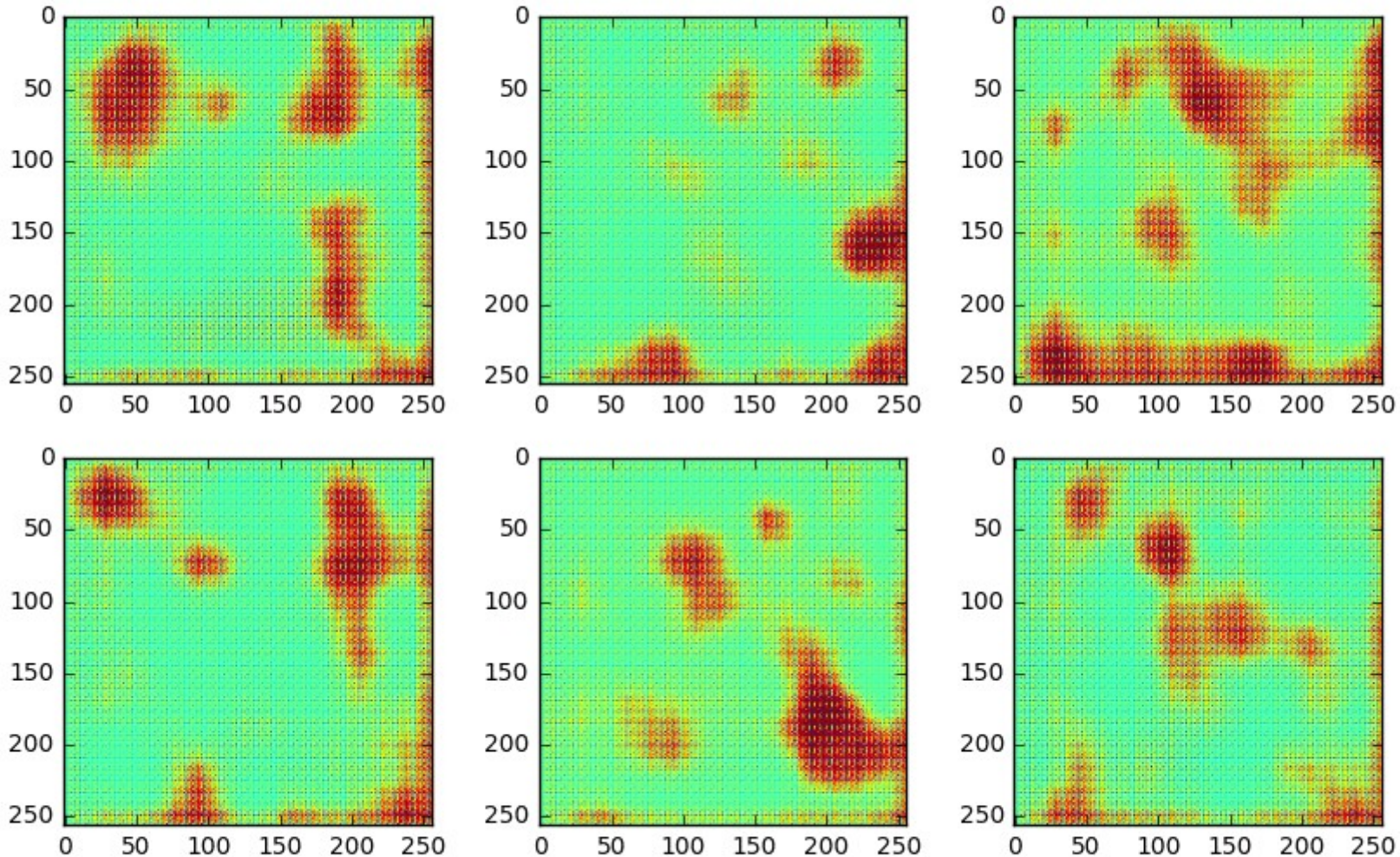

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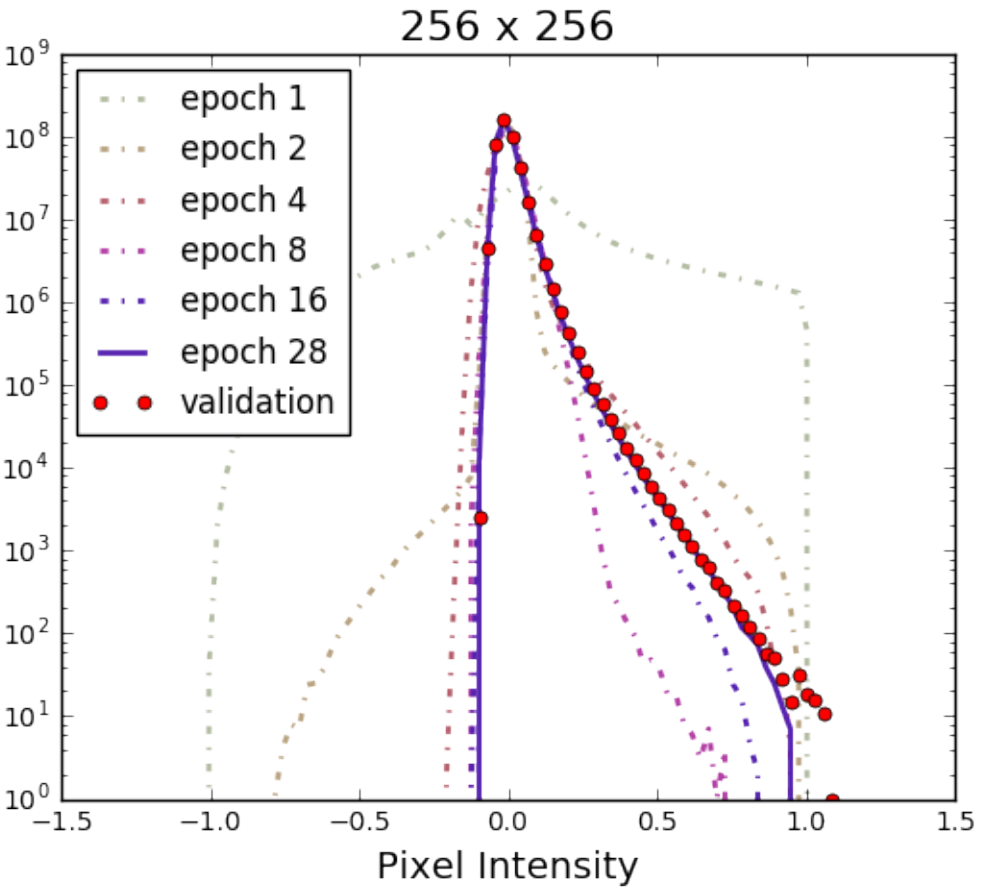

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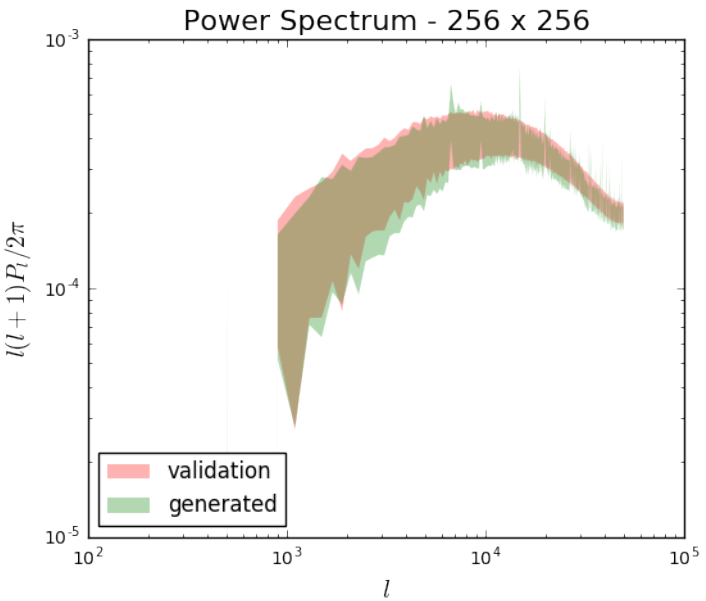

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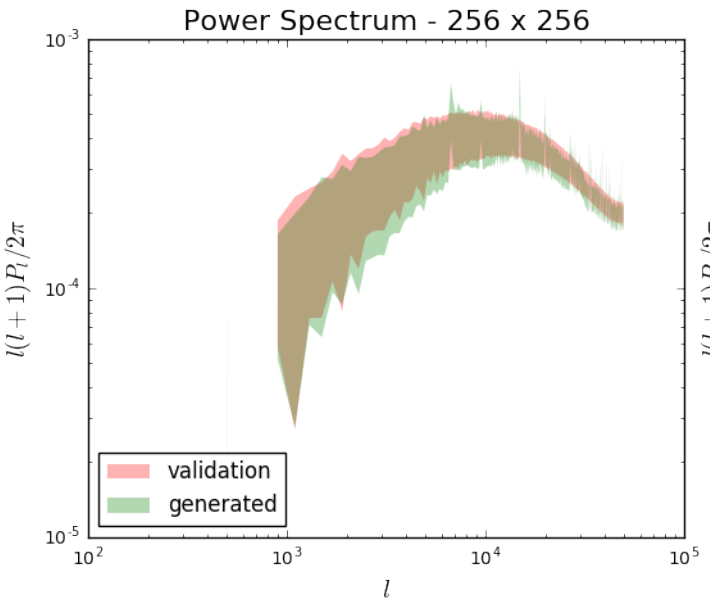

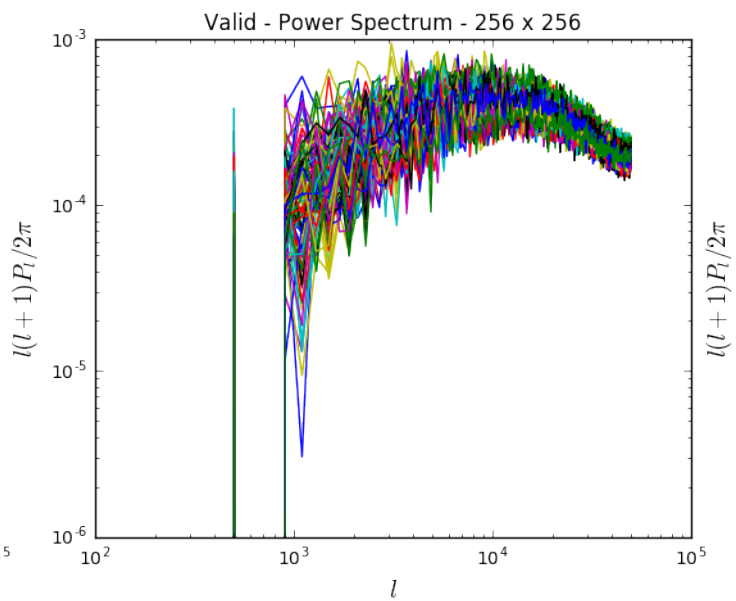

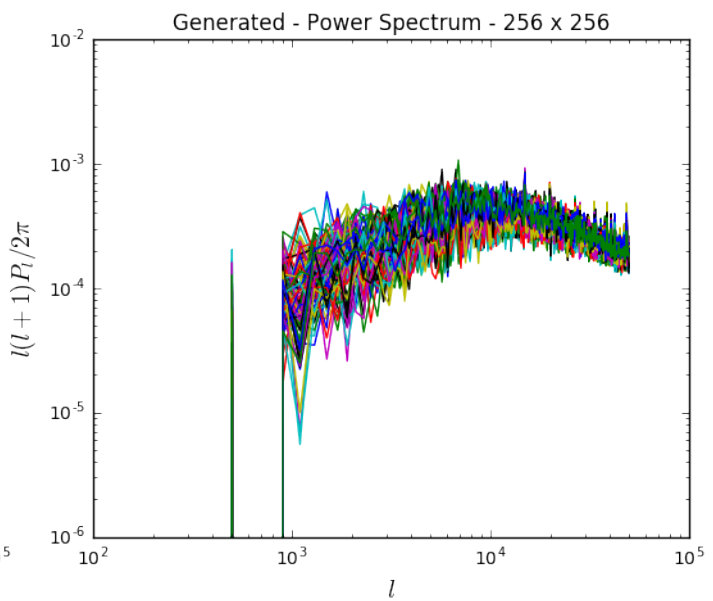

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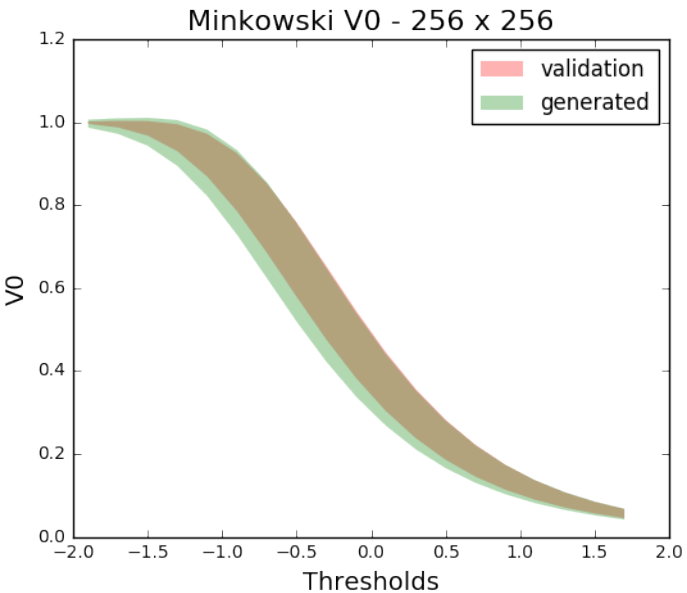

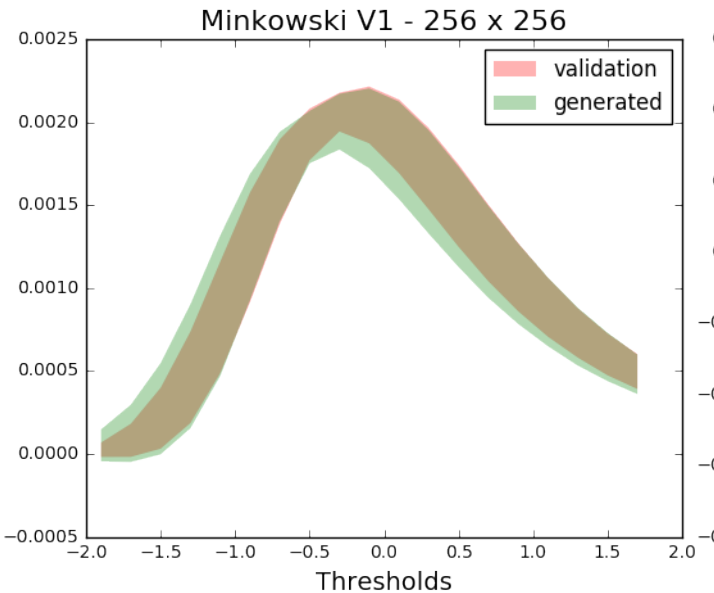

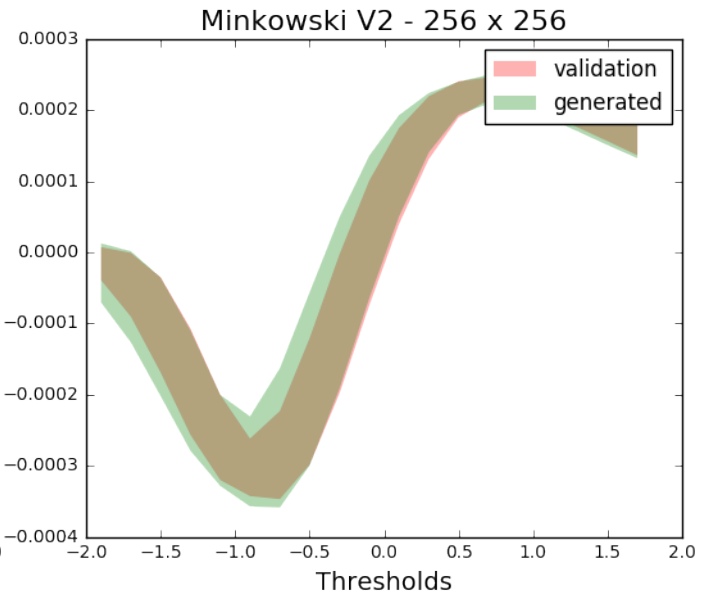

Publication plan

Stage – I
The purpose of the first stage is to highlight the potential capabilities of using Generative Models to accelerate scientific simulations.

Venues:
1) Nature Letter
2) Nature Communications
3) Science

A possible twist: How important is what we are doing to Deep Learning?

Stage – II
We continue with our scientific investigations. Most importantly:

1) Interpretation of what the network is learning about the physics
2) Parametric Generators