Dealing with Dust Foregrounds in CMB B-mode Observations

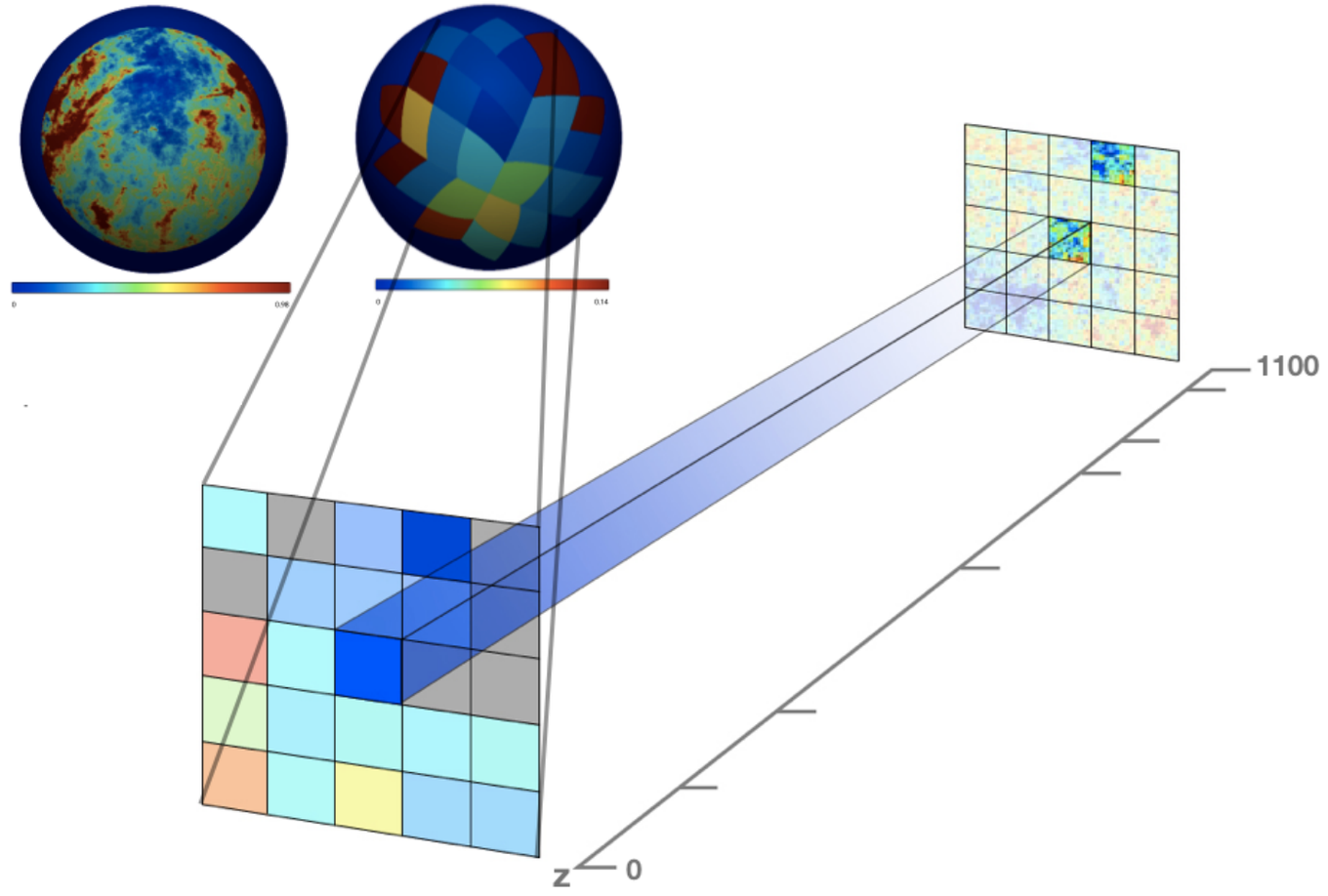
Ely D. Kovetz
Johns Hopkins University
Journal Club @IAP Paris, Jun. 16th, 2015

Based on:

arXiv:1308.1404
arXiv:1408.4125
arXiv:1502.00625

and current work with:

M. Kamionkowski (JHU)



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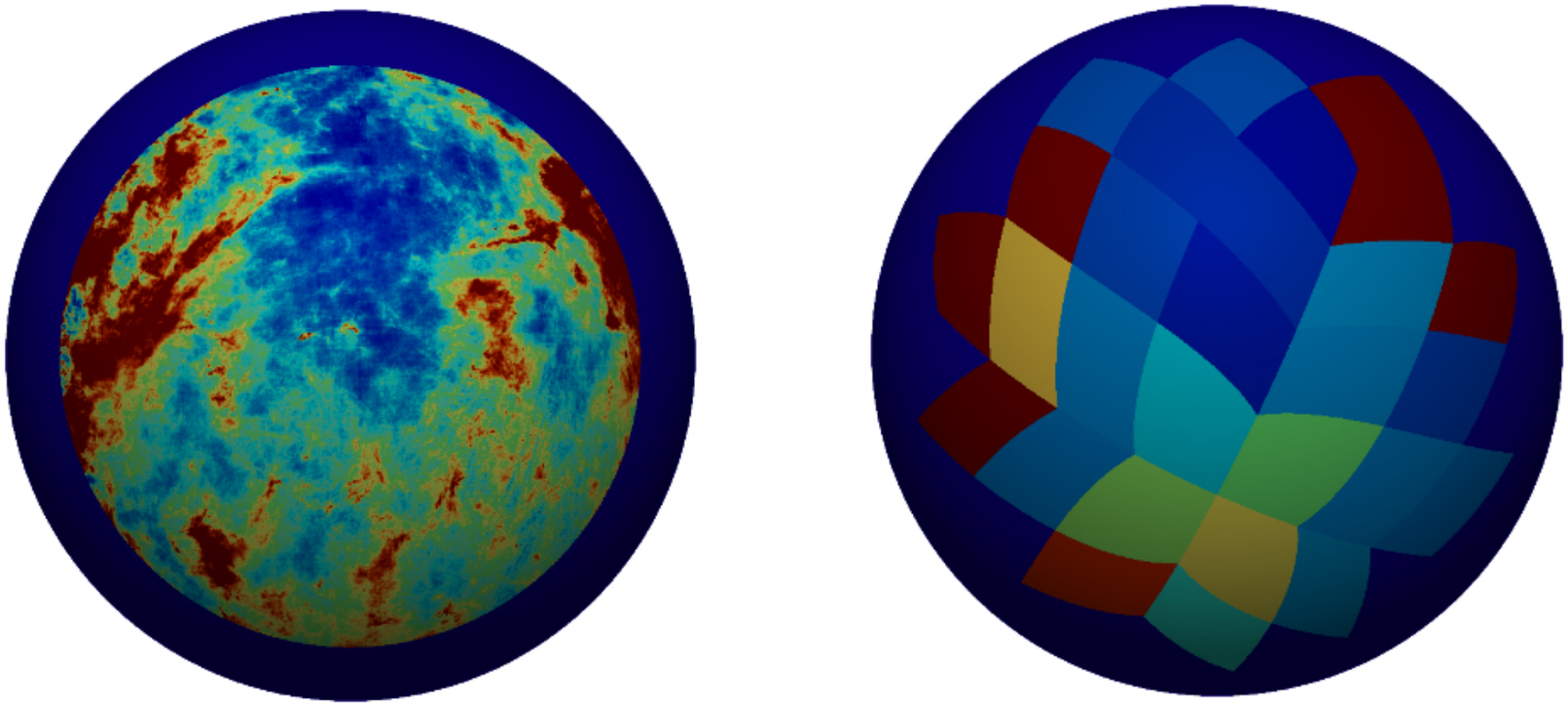

Templates for polarized emission from dust (PED) in the Galaxy at 150GHz

(Clark et al. arXiv:1211.6404)

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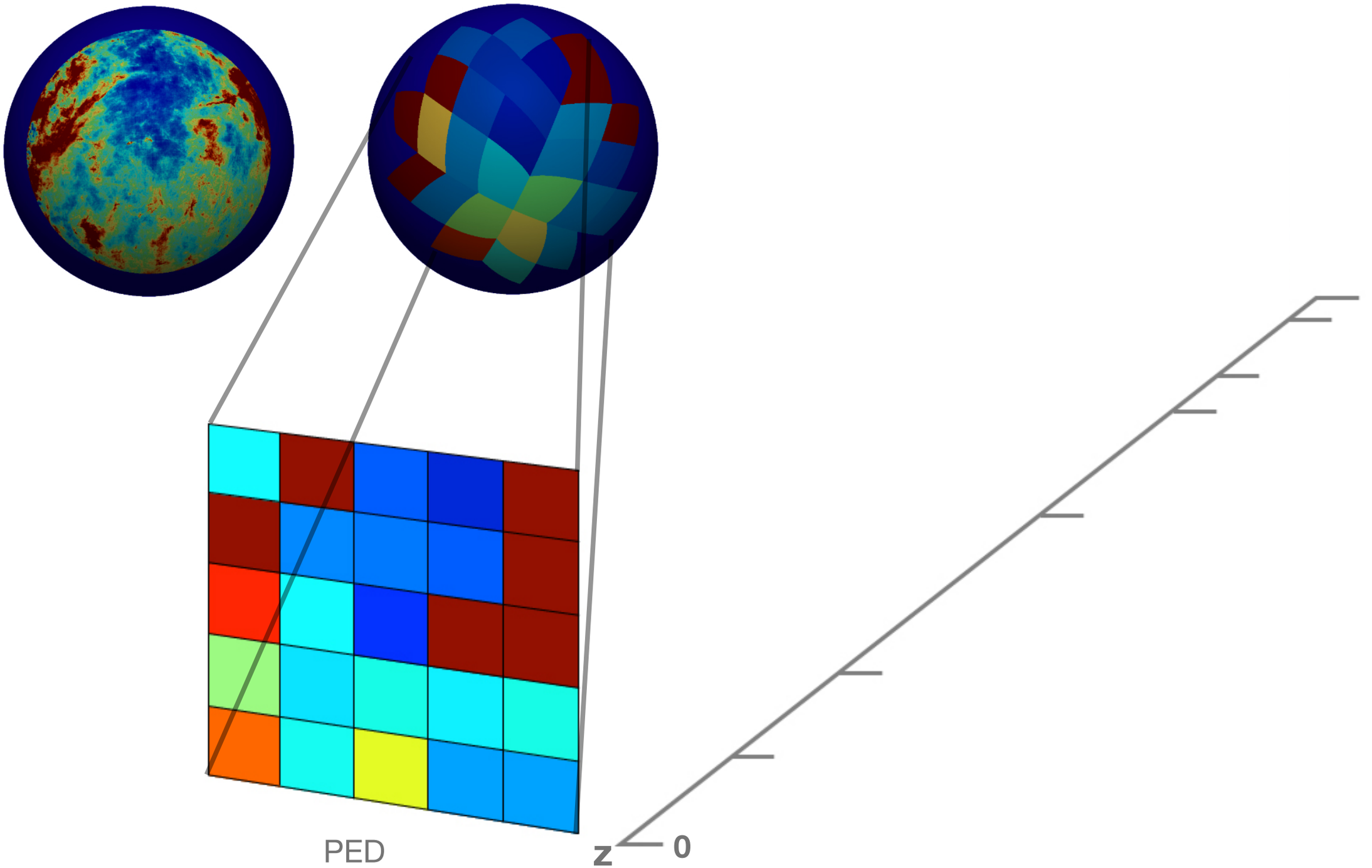
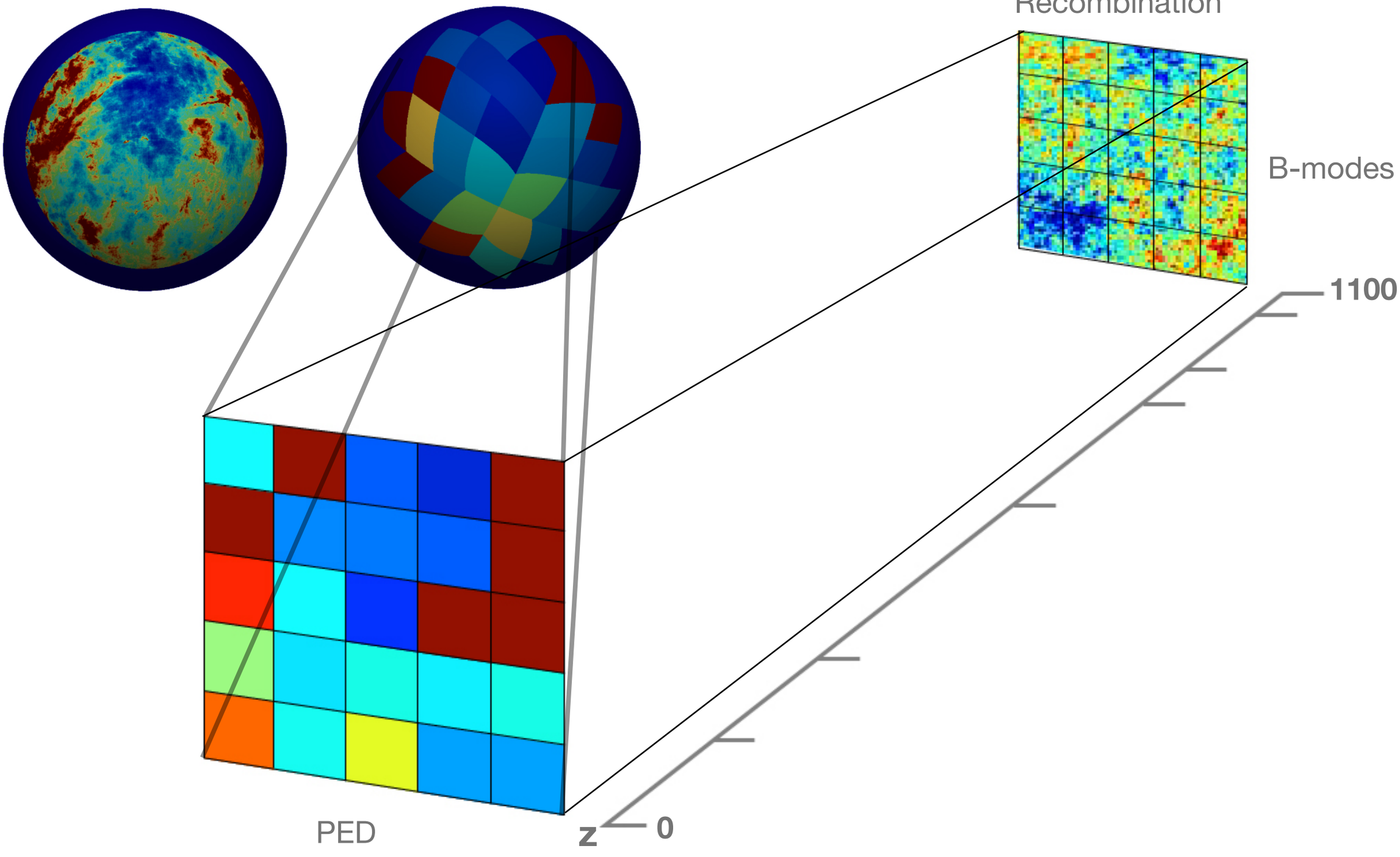


Exploration vs. Exploitation: B-mode Surveys



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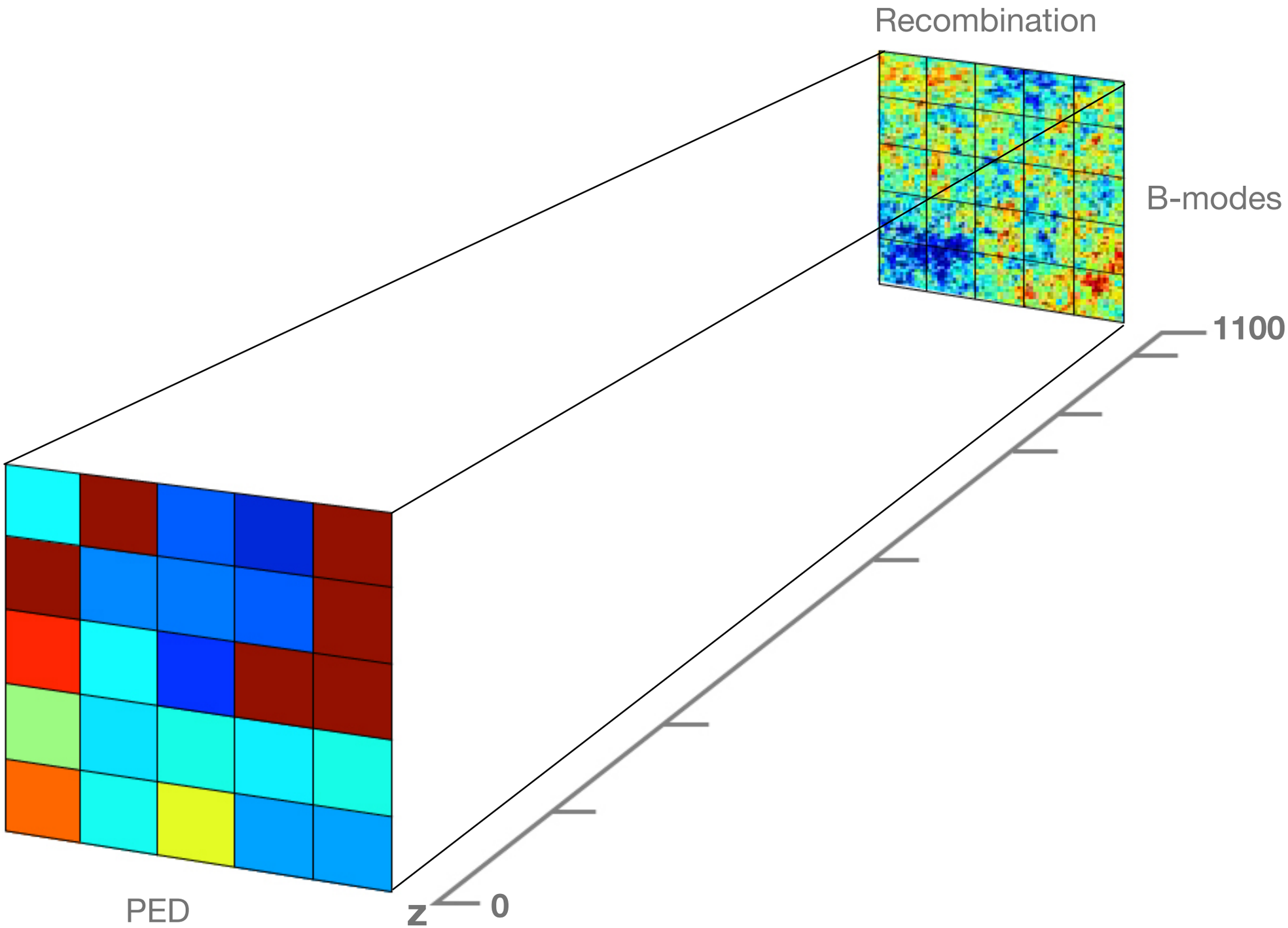

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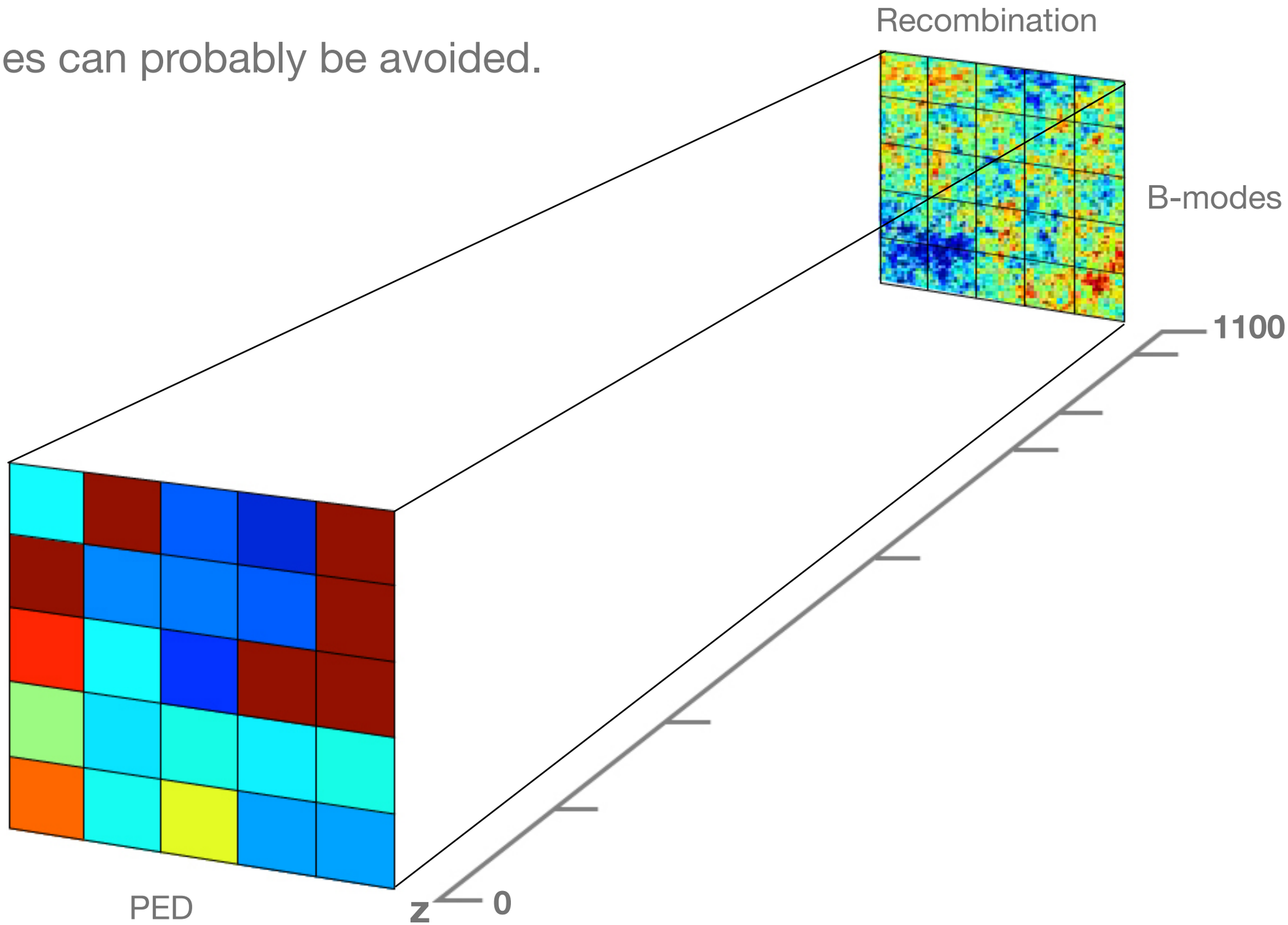

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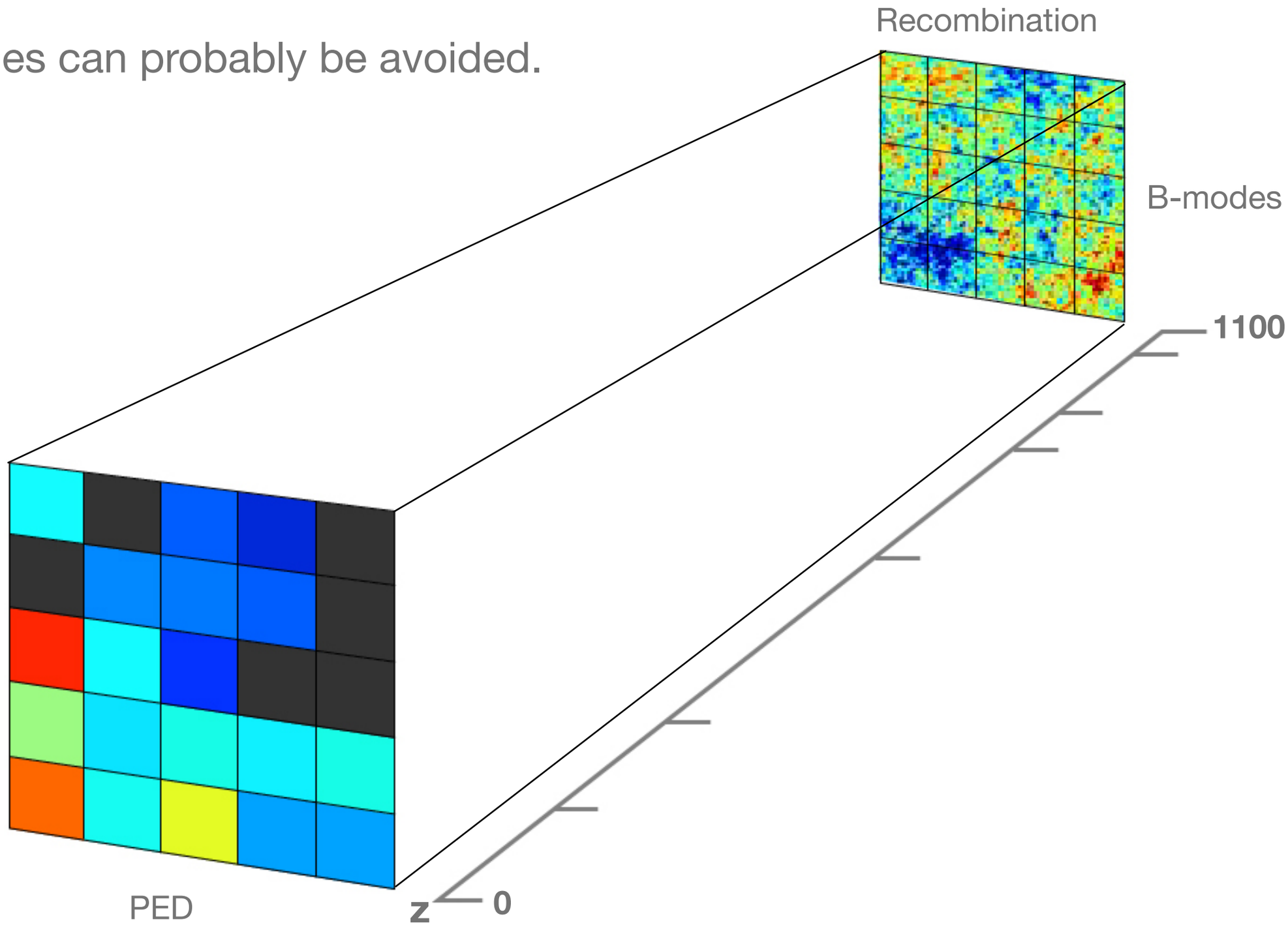

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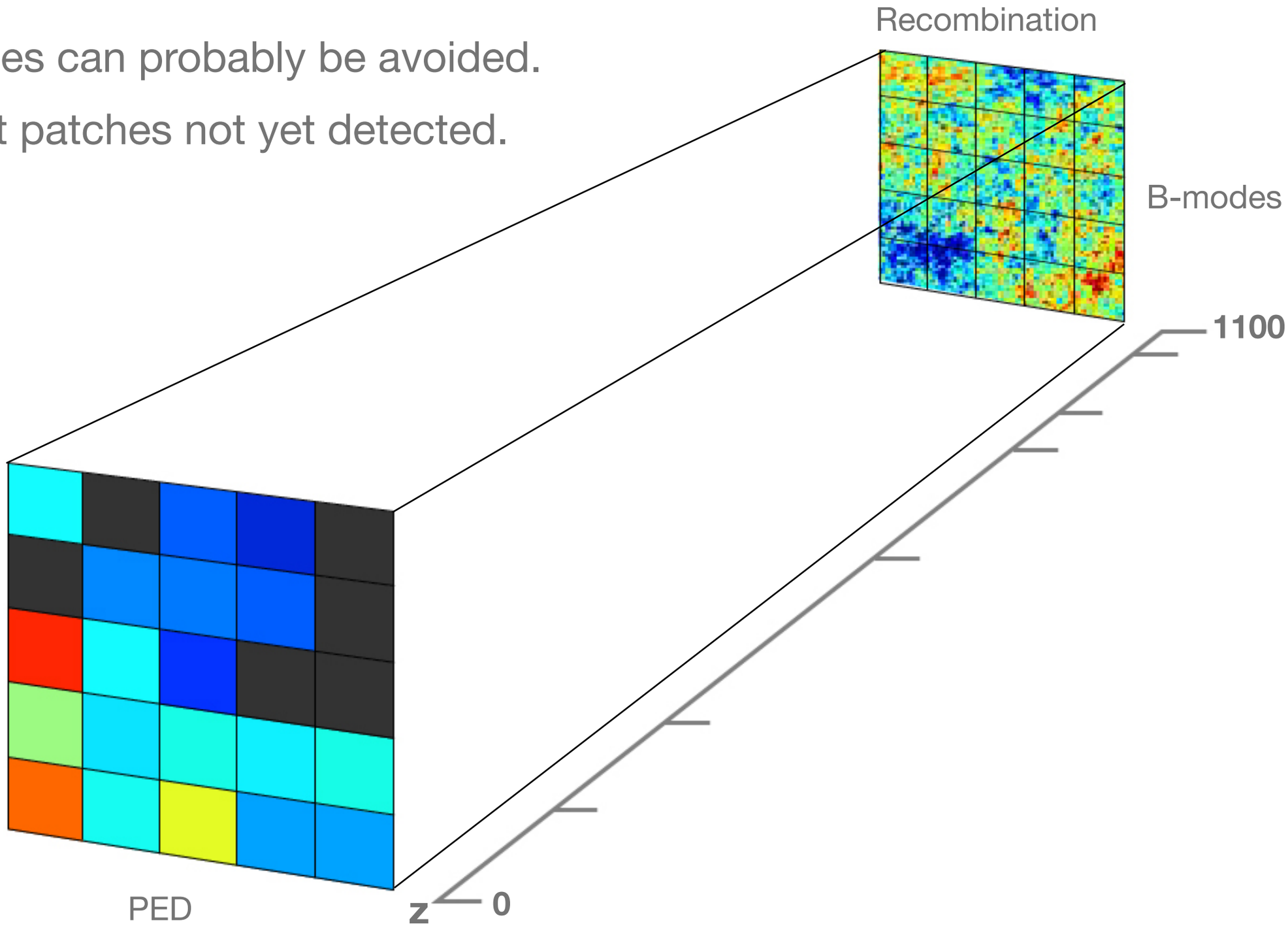

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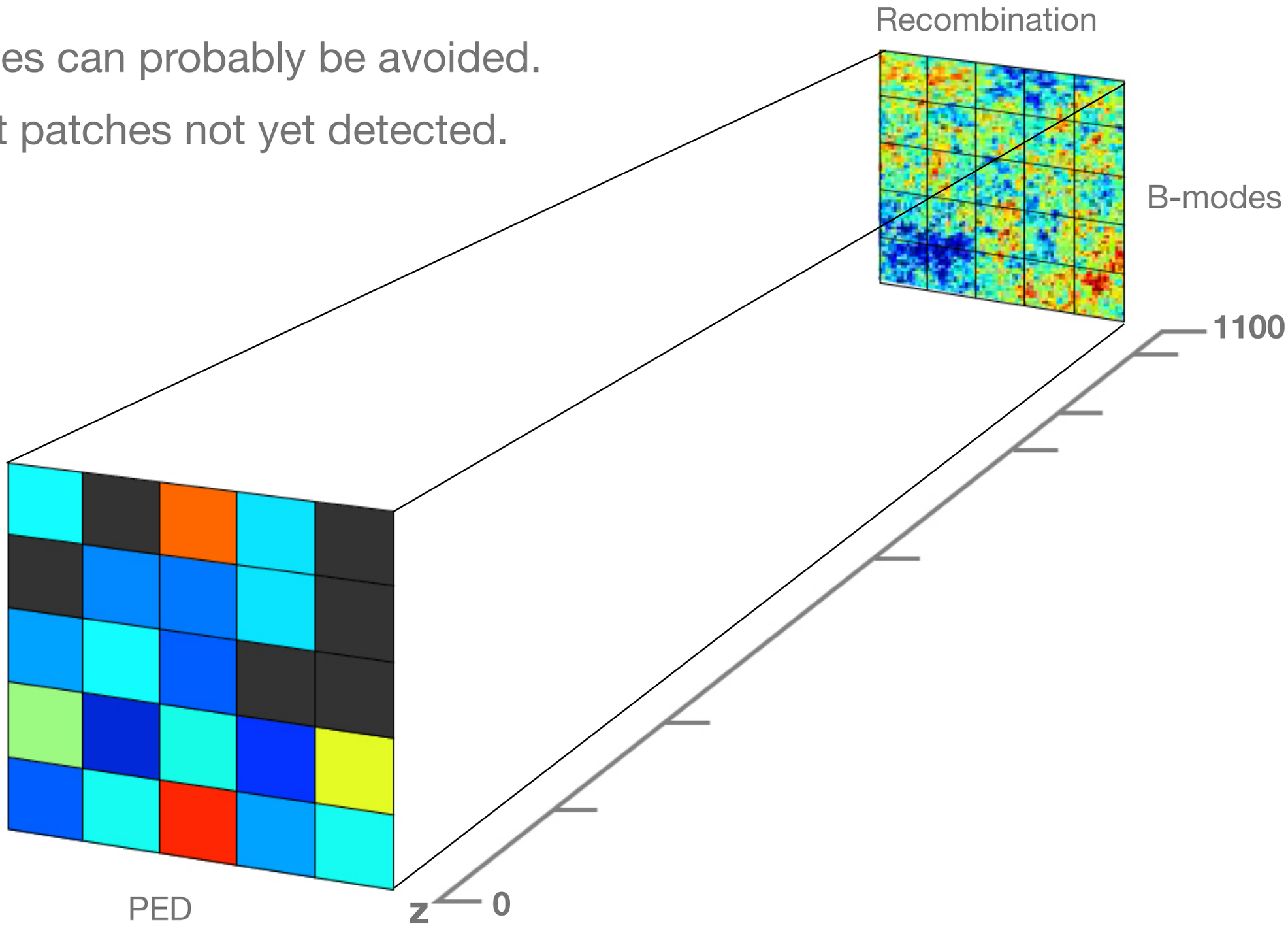

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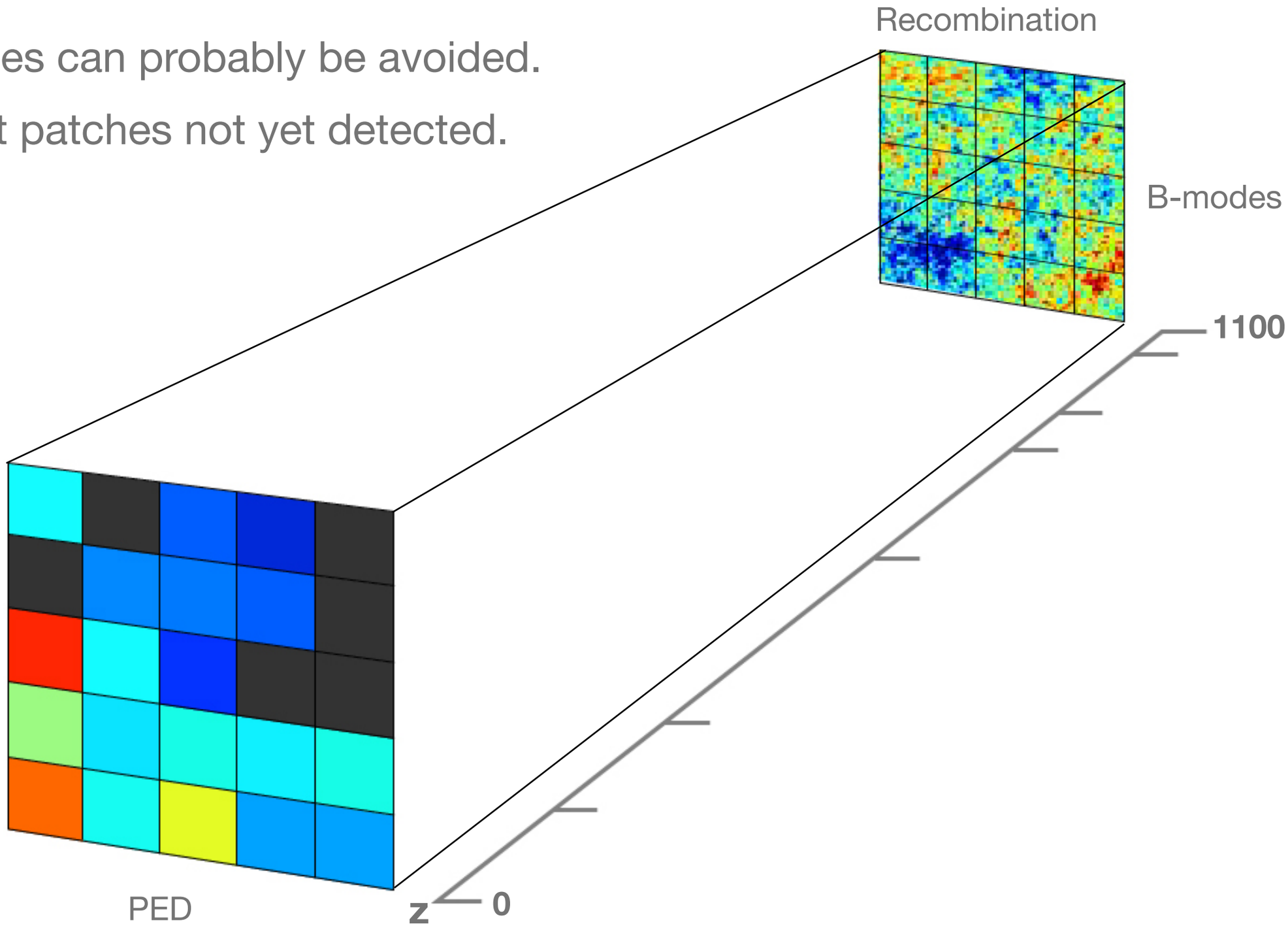

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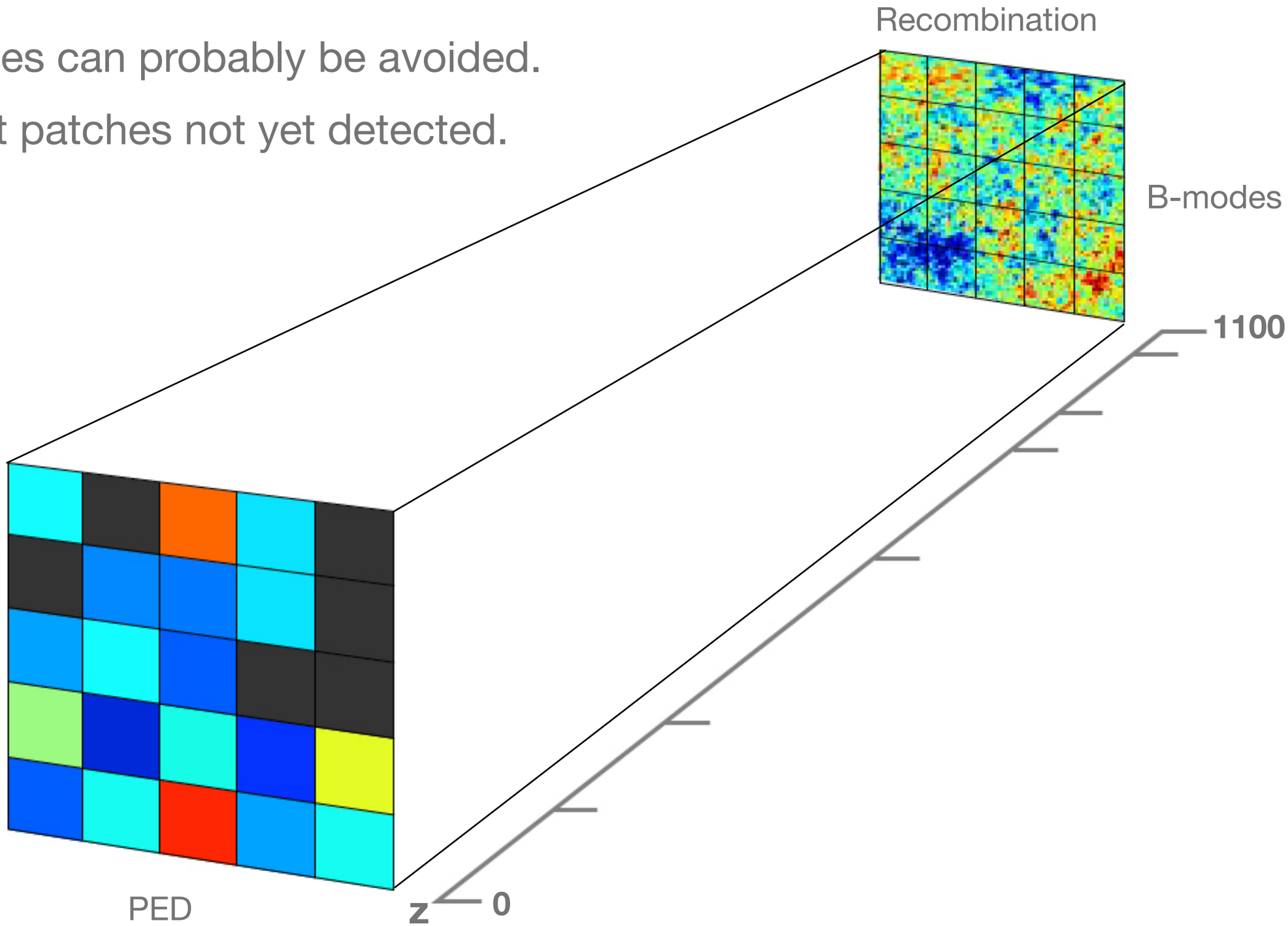

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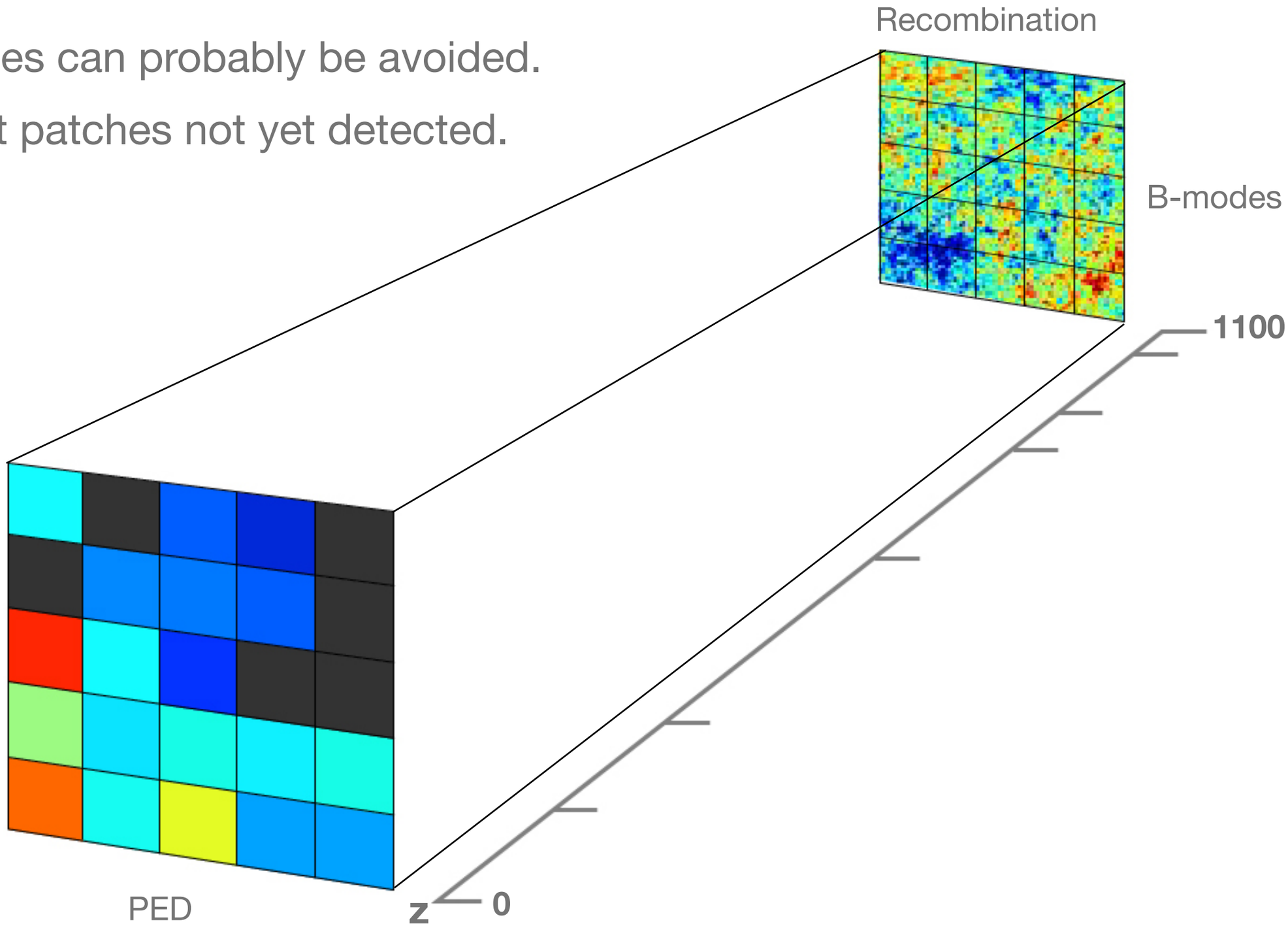

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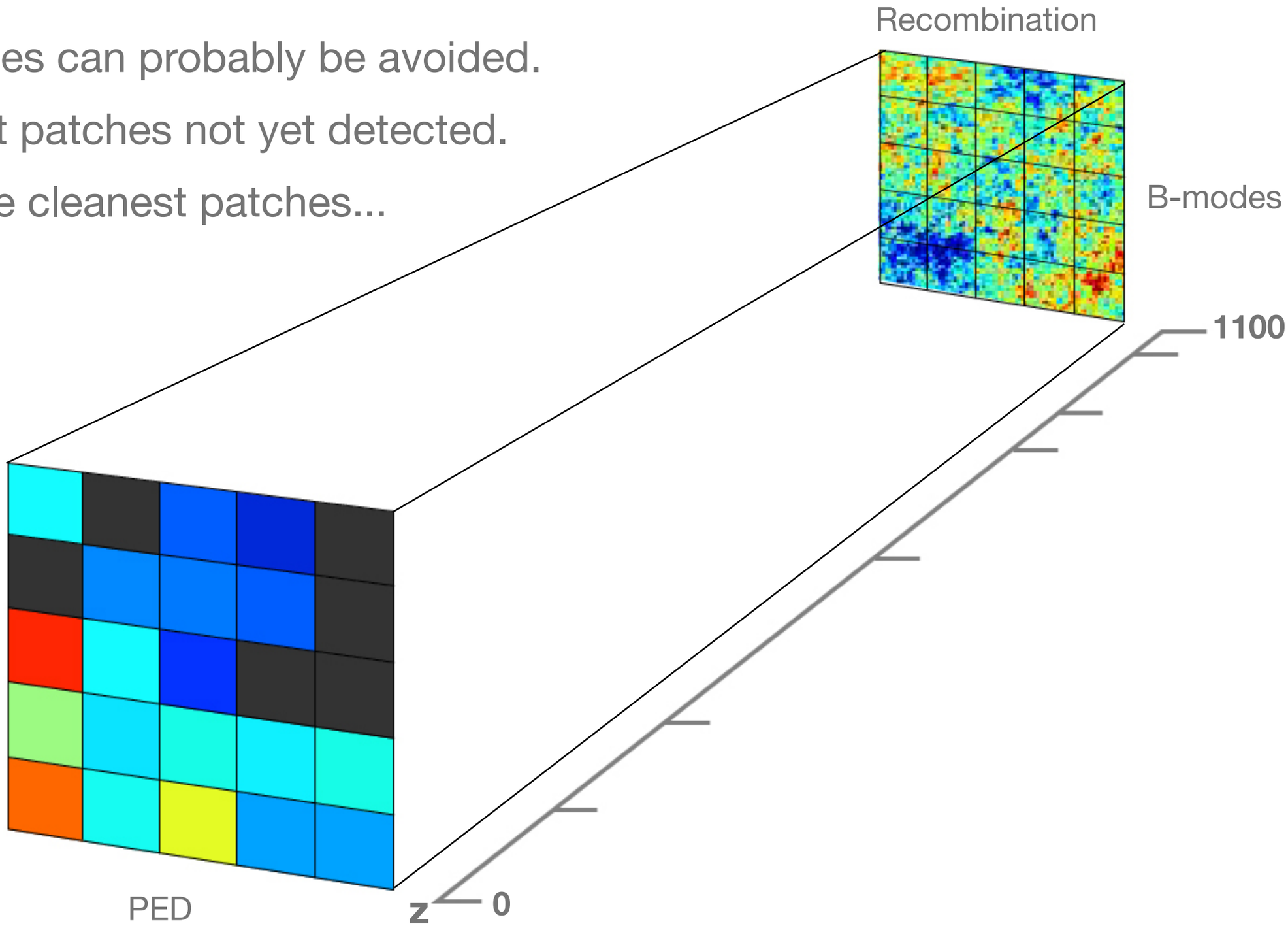

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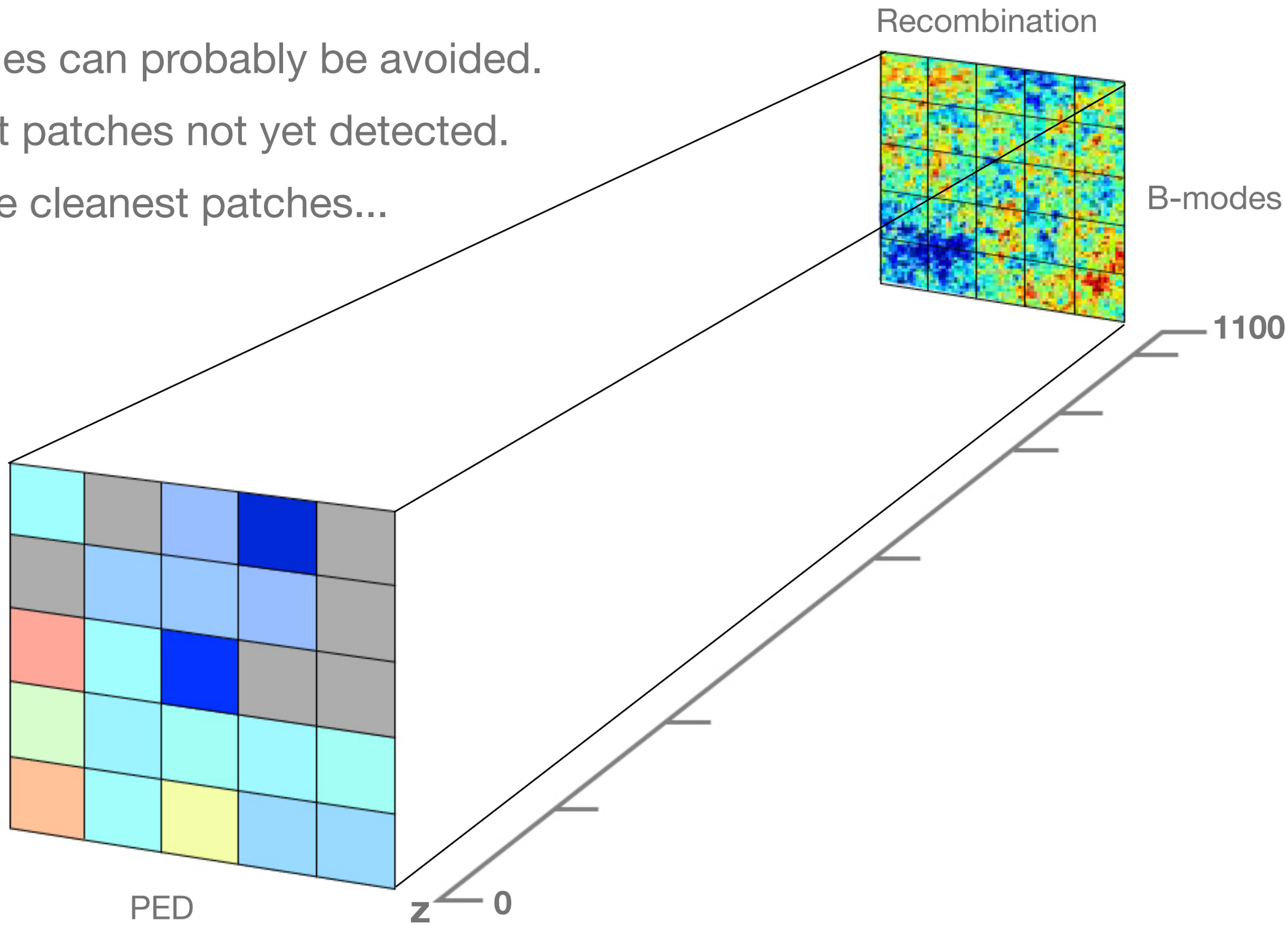

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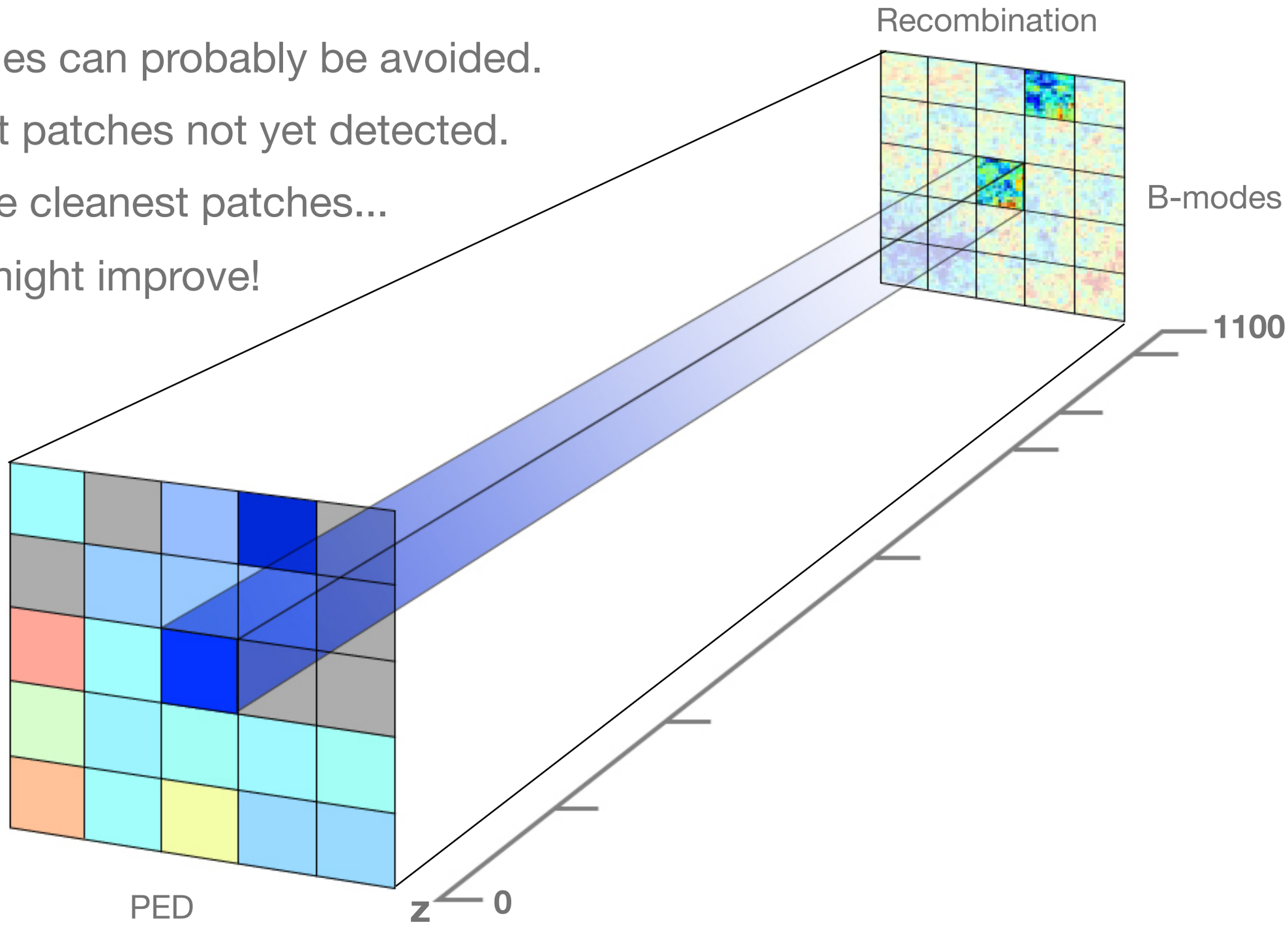
- Sensitivity might improve!



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- Heuristics have been developed and compared.
- We showed that with MAB strategies, B-mode sensitivity improves by factors 2-3.

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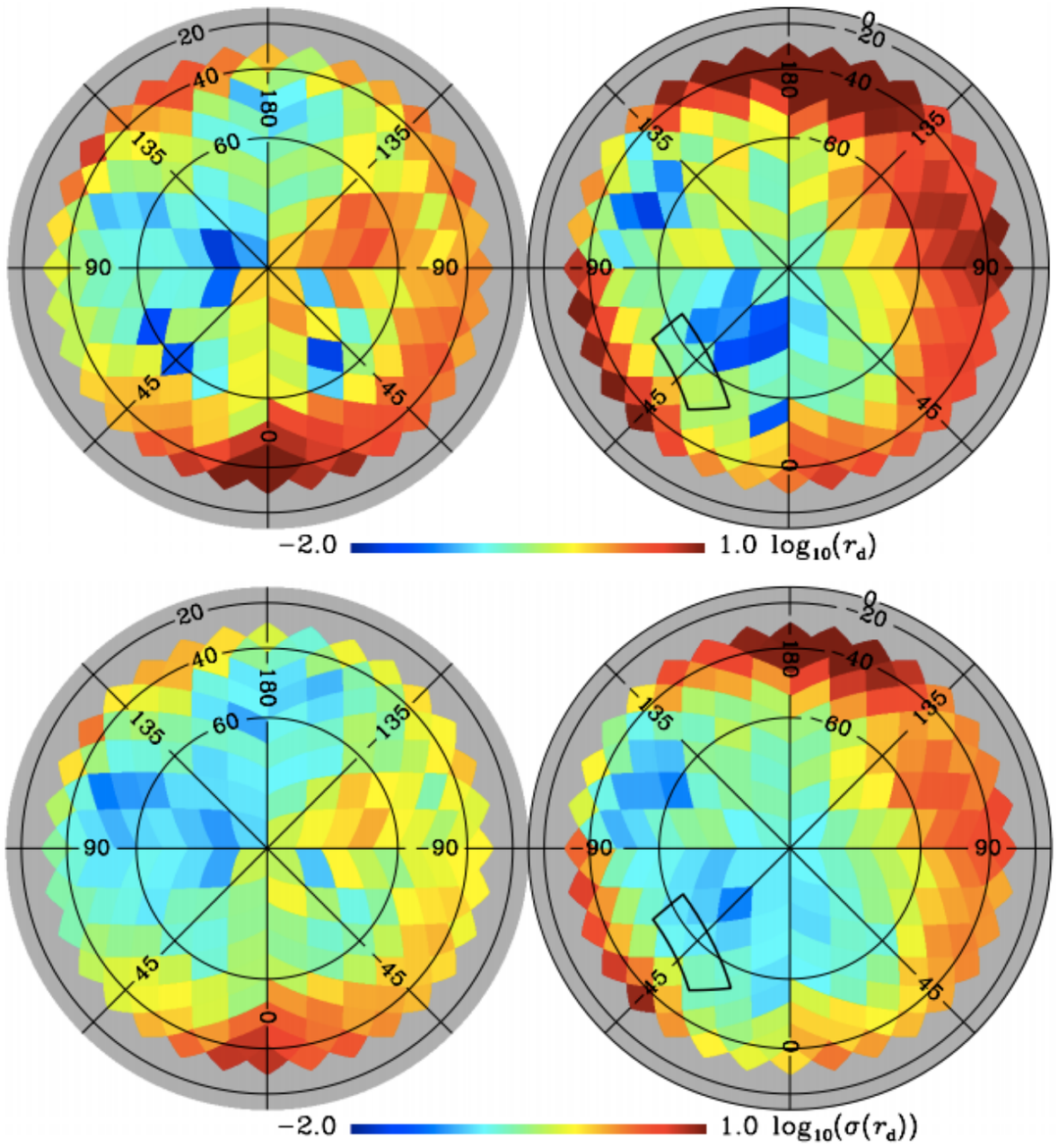

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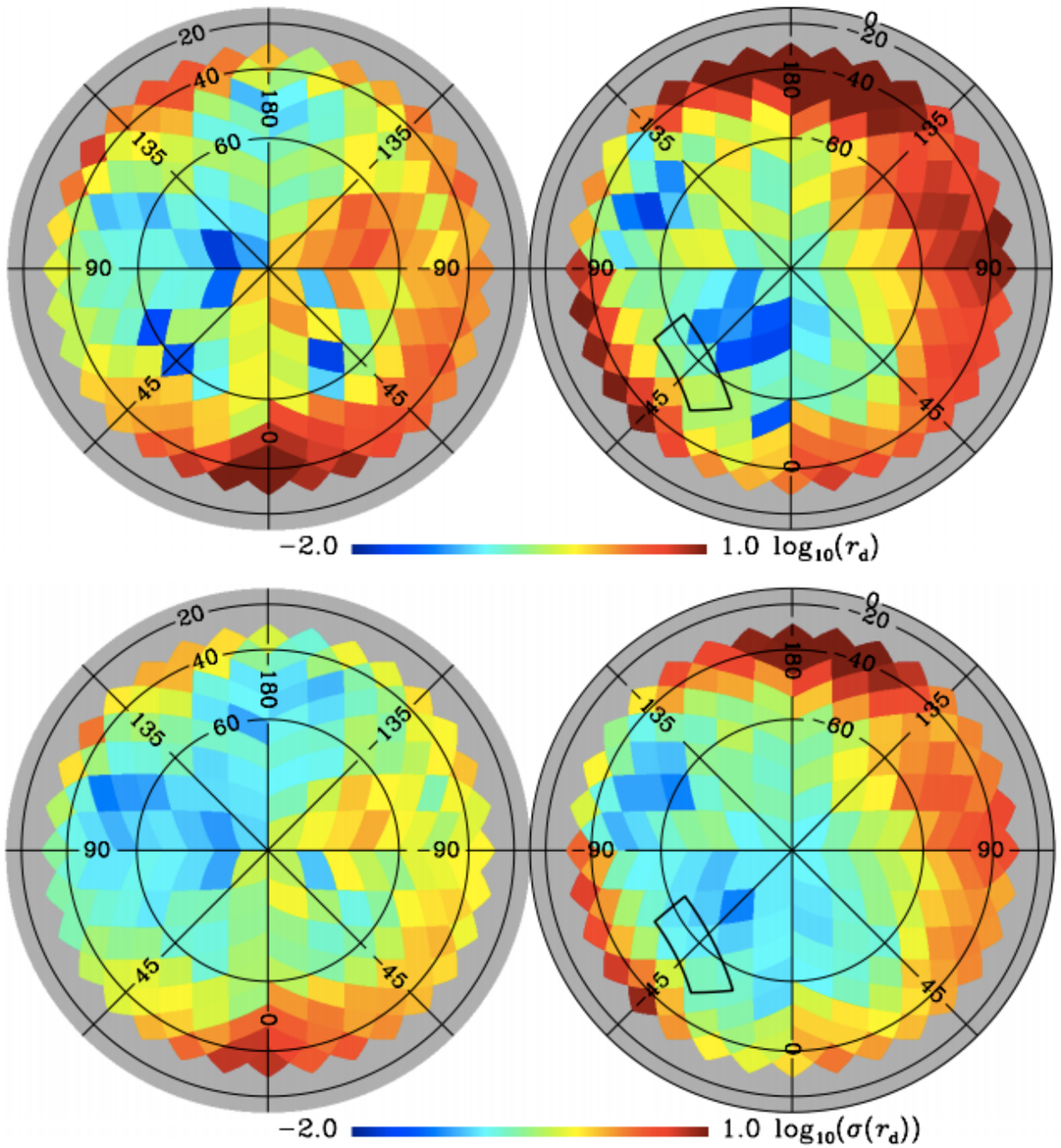

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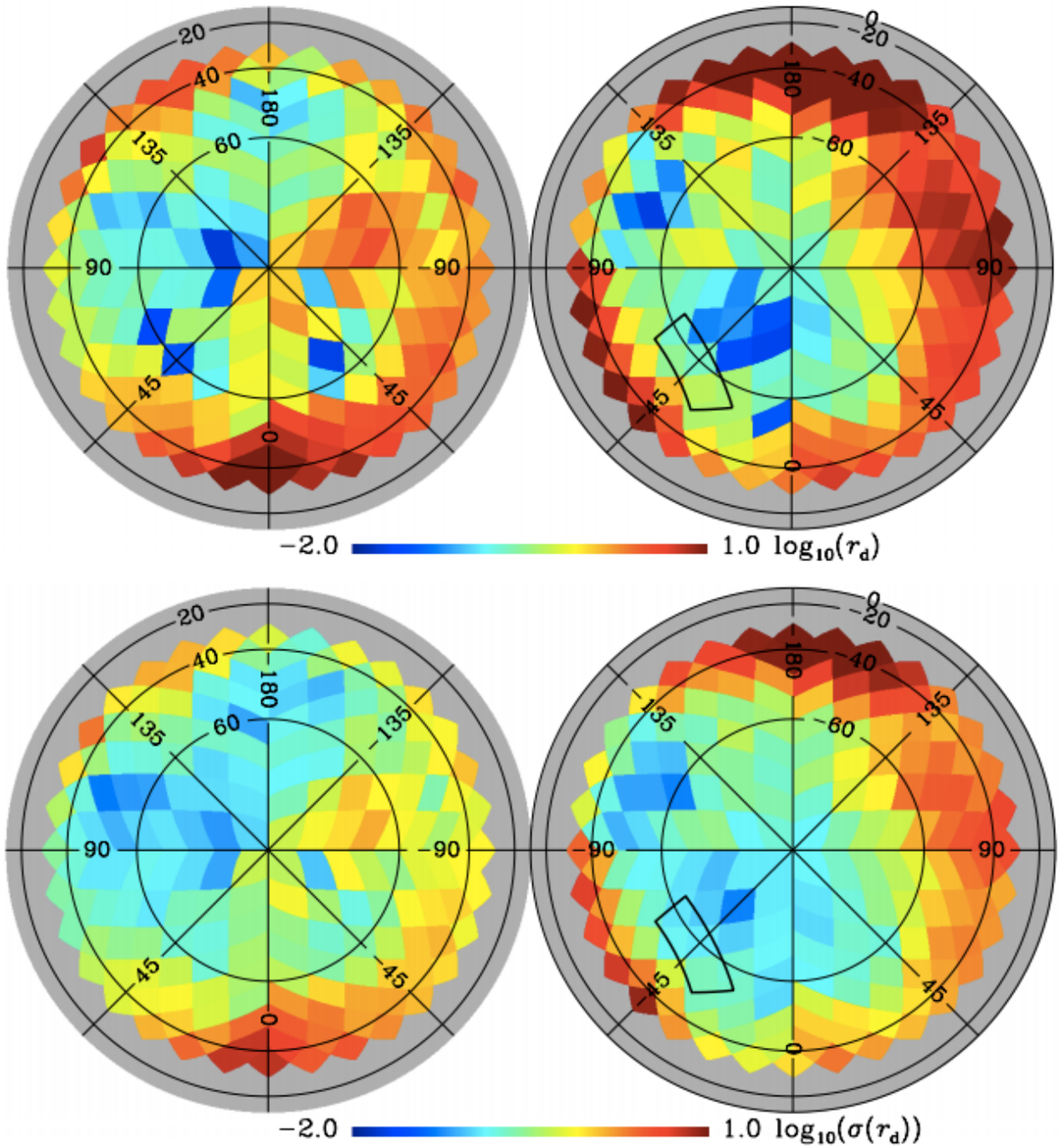
- How do we choose which one for prolonged integration?



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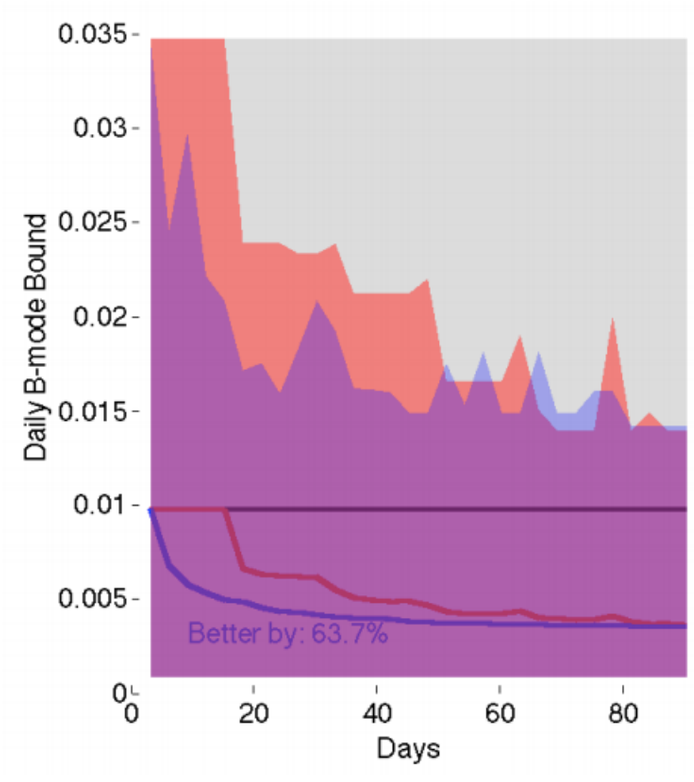
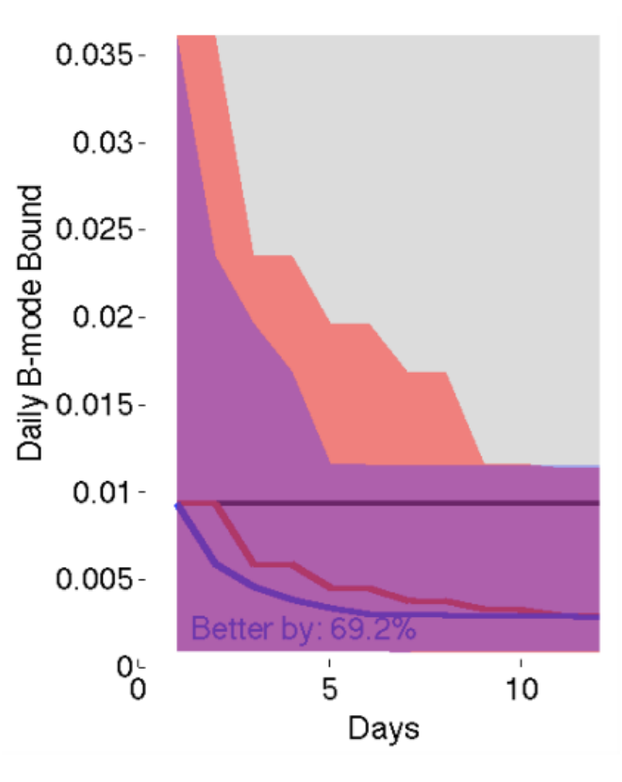
- We showed that upper bound on r can be reduced as much as 70%:





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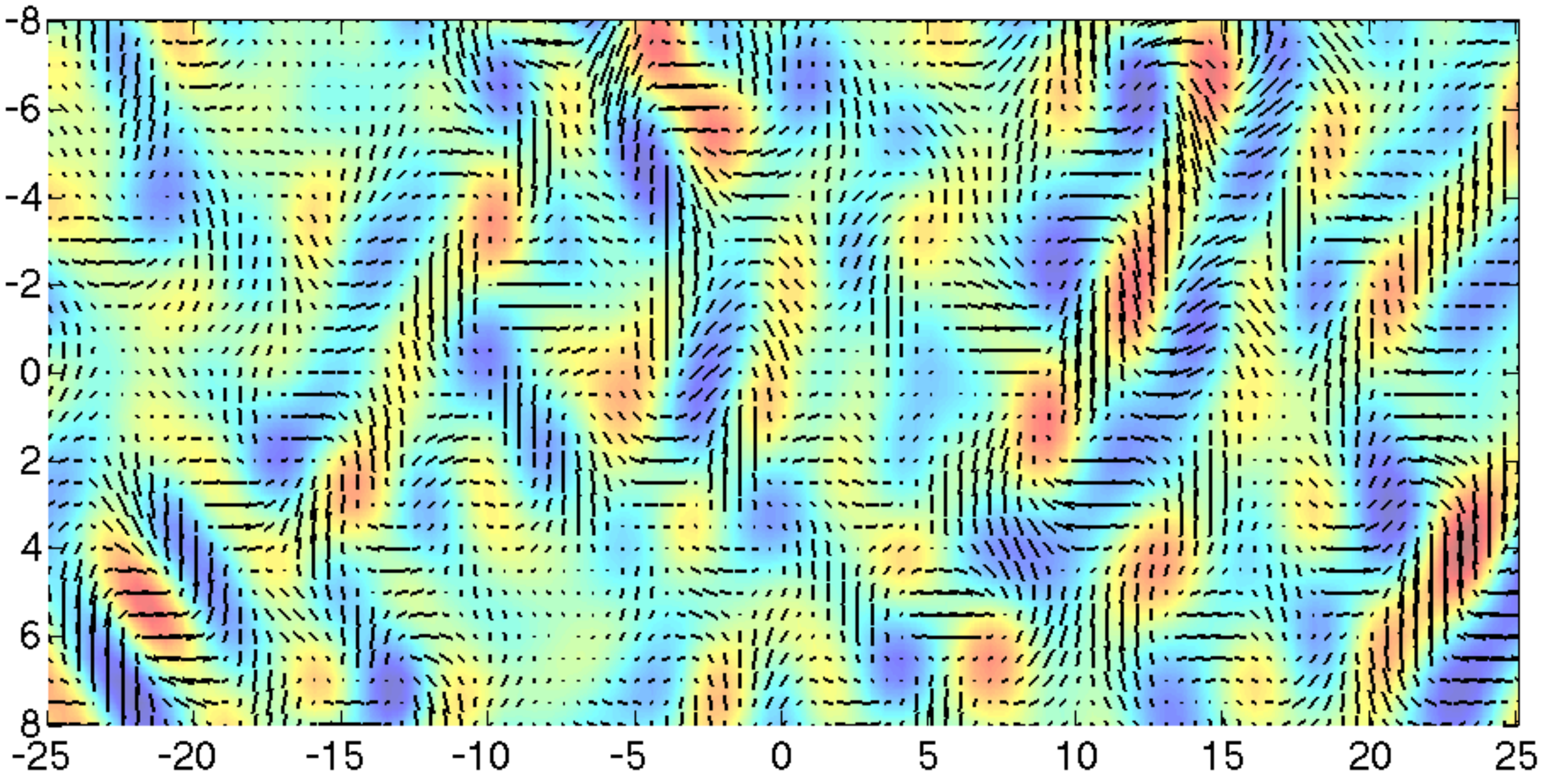

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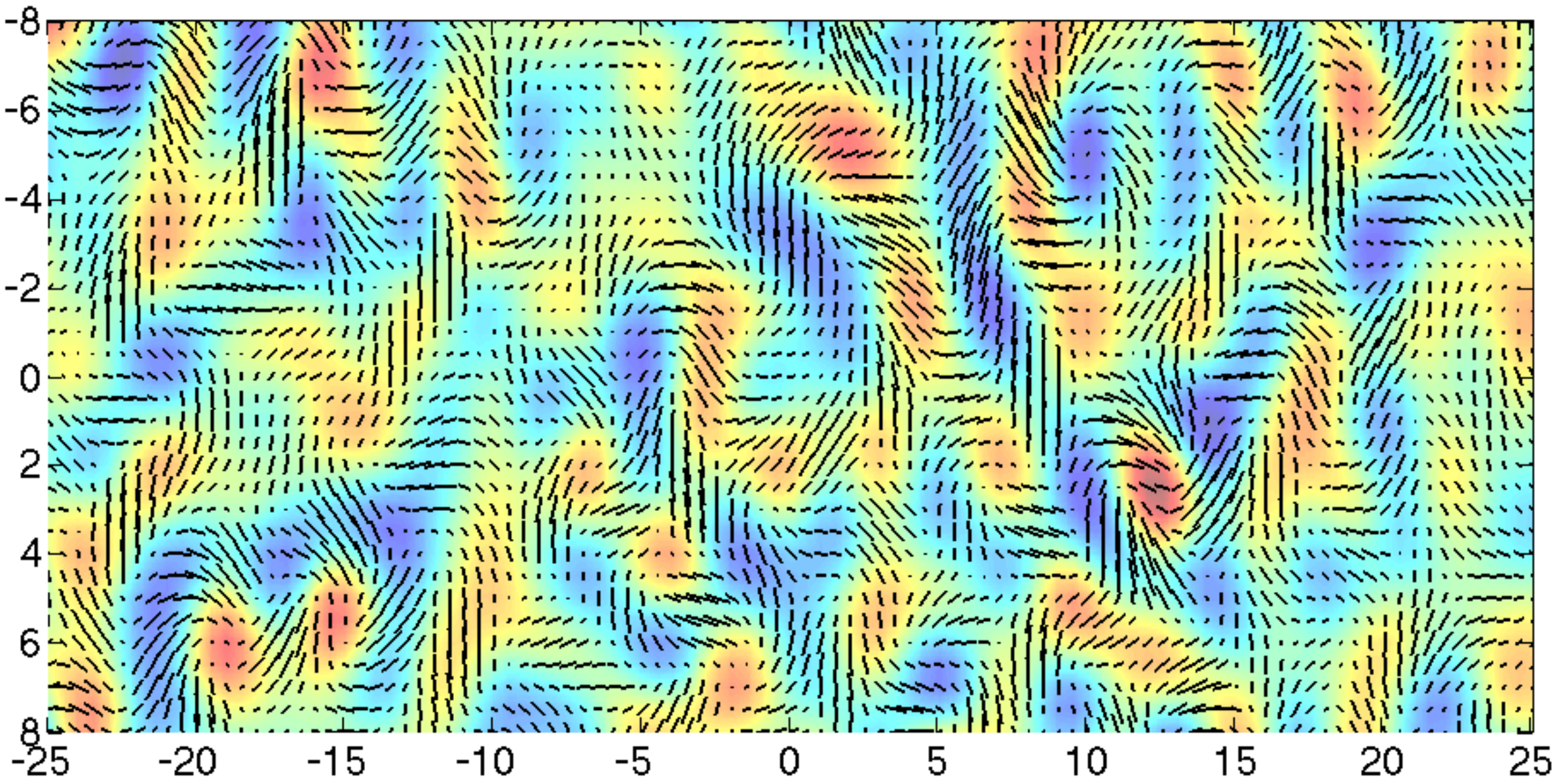

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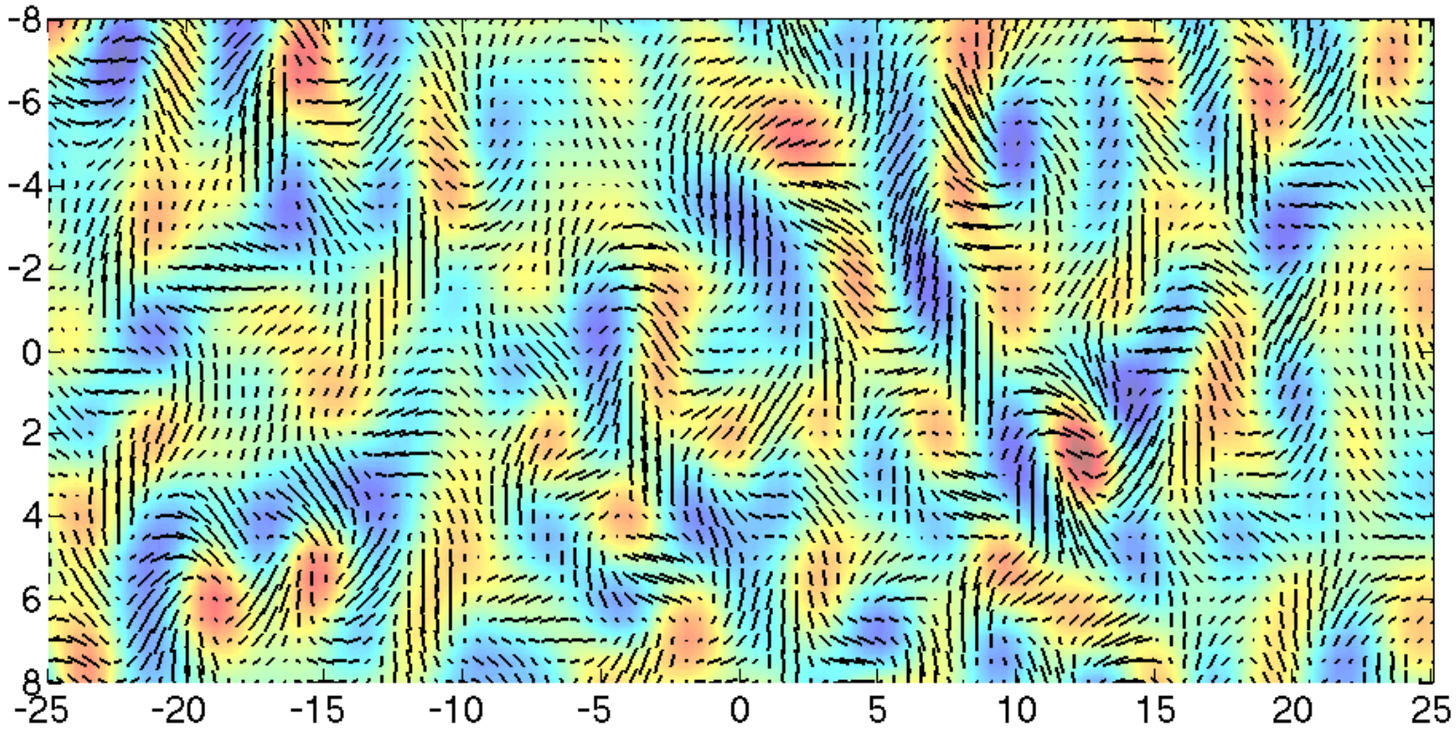

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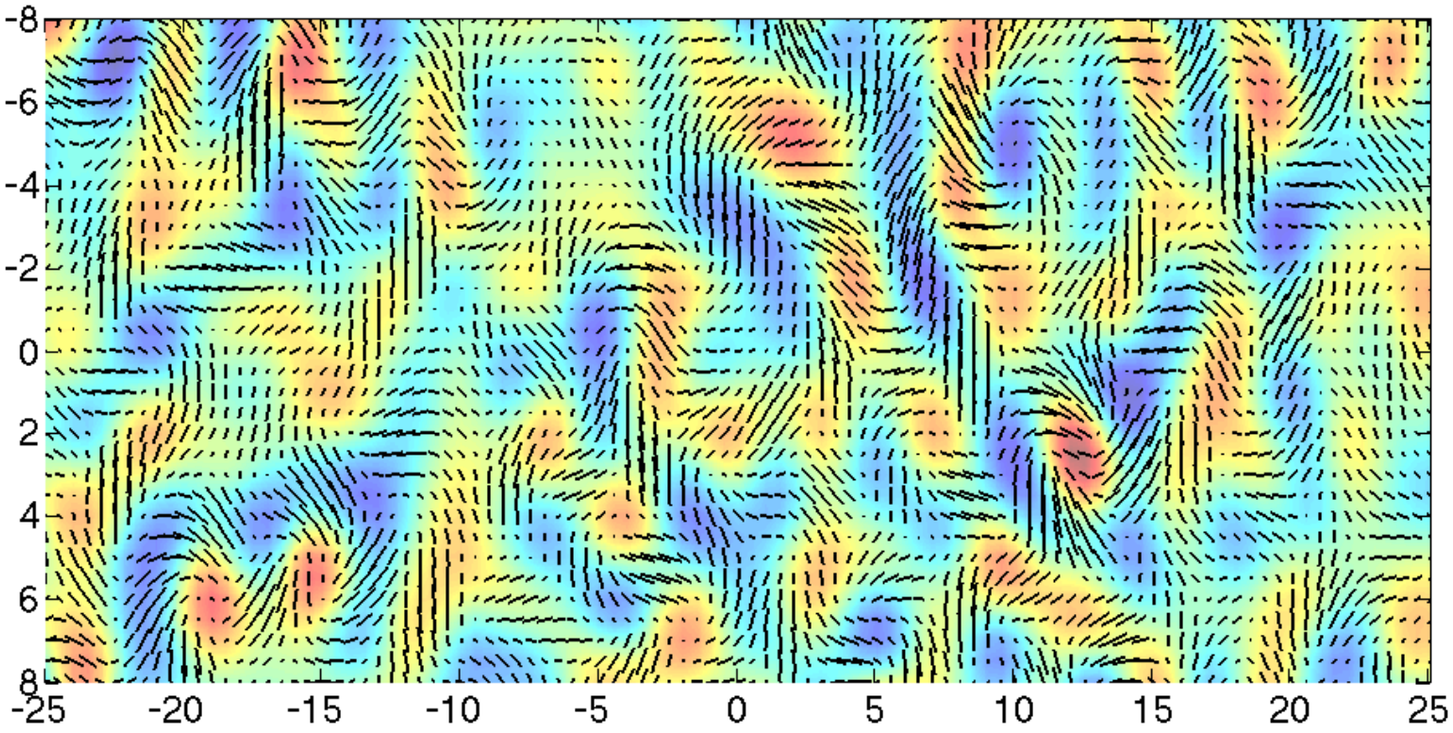

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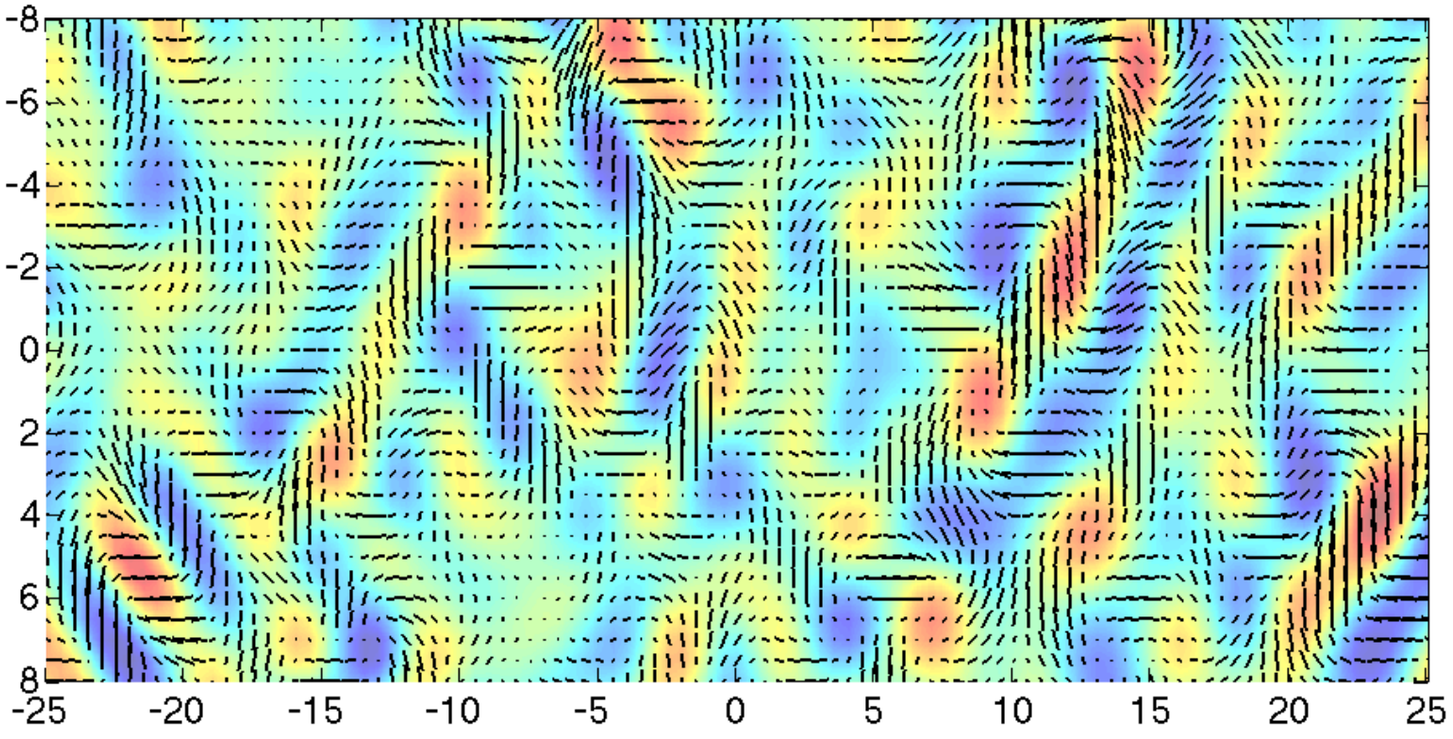

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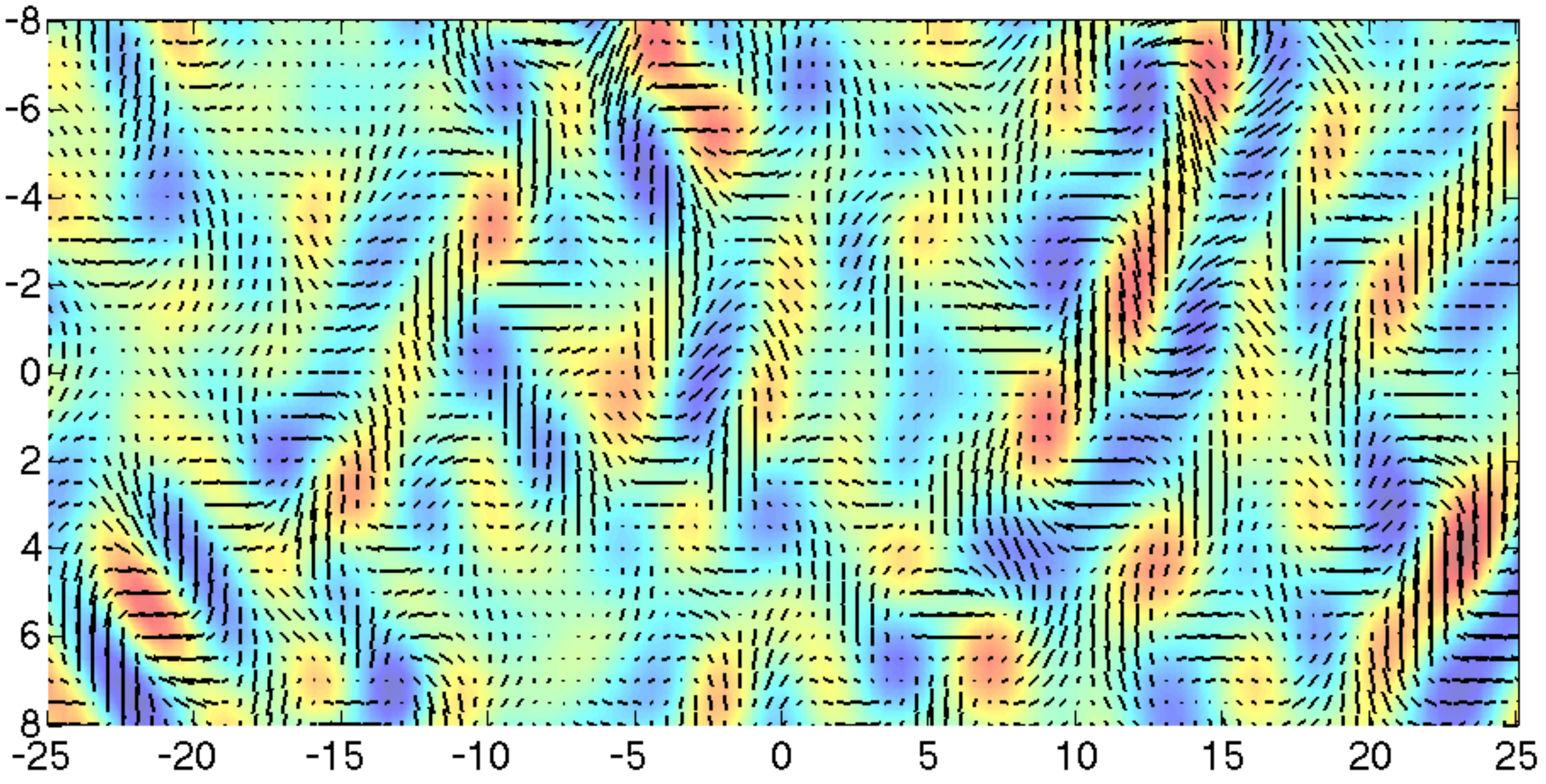

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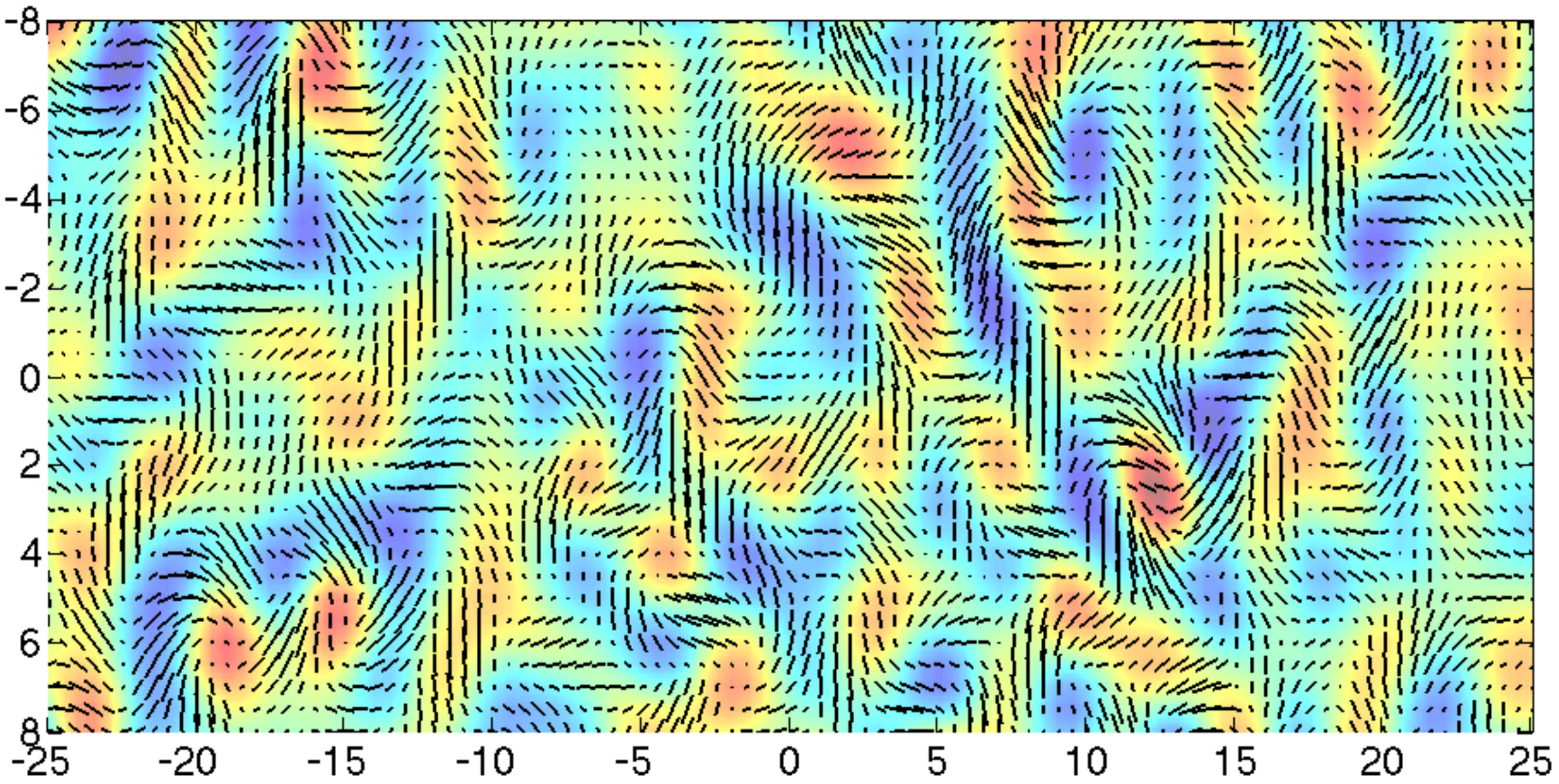

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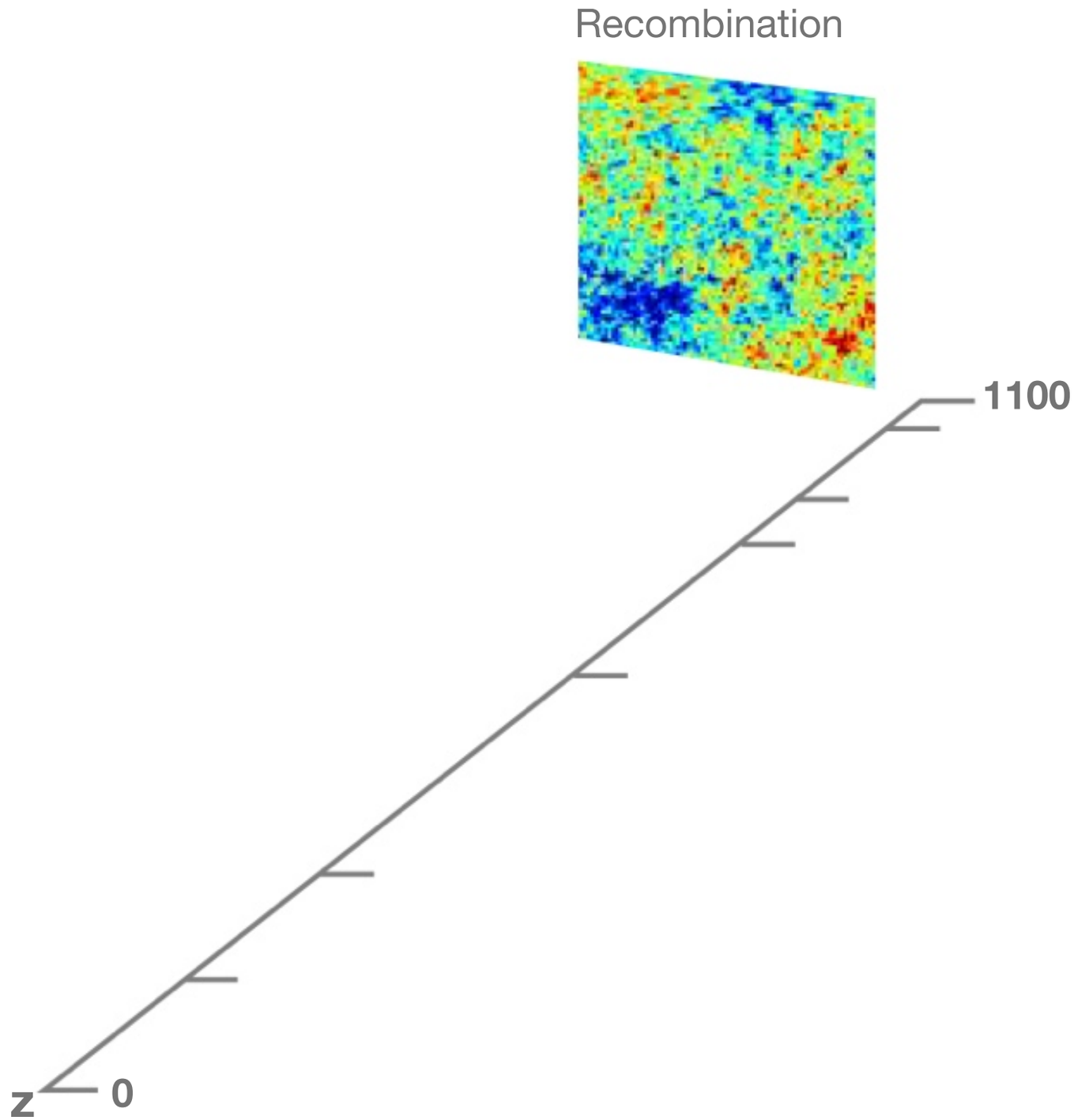

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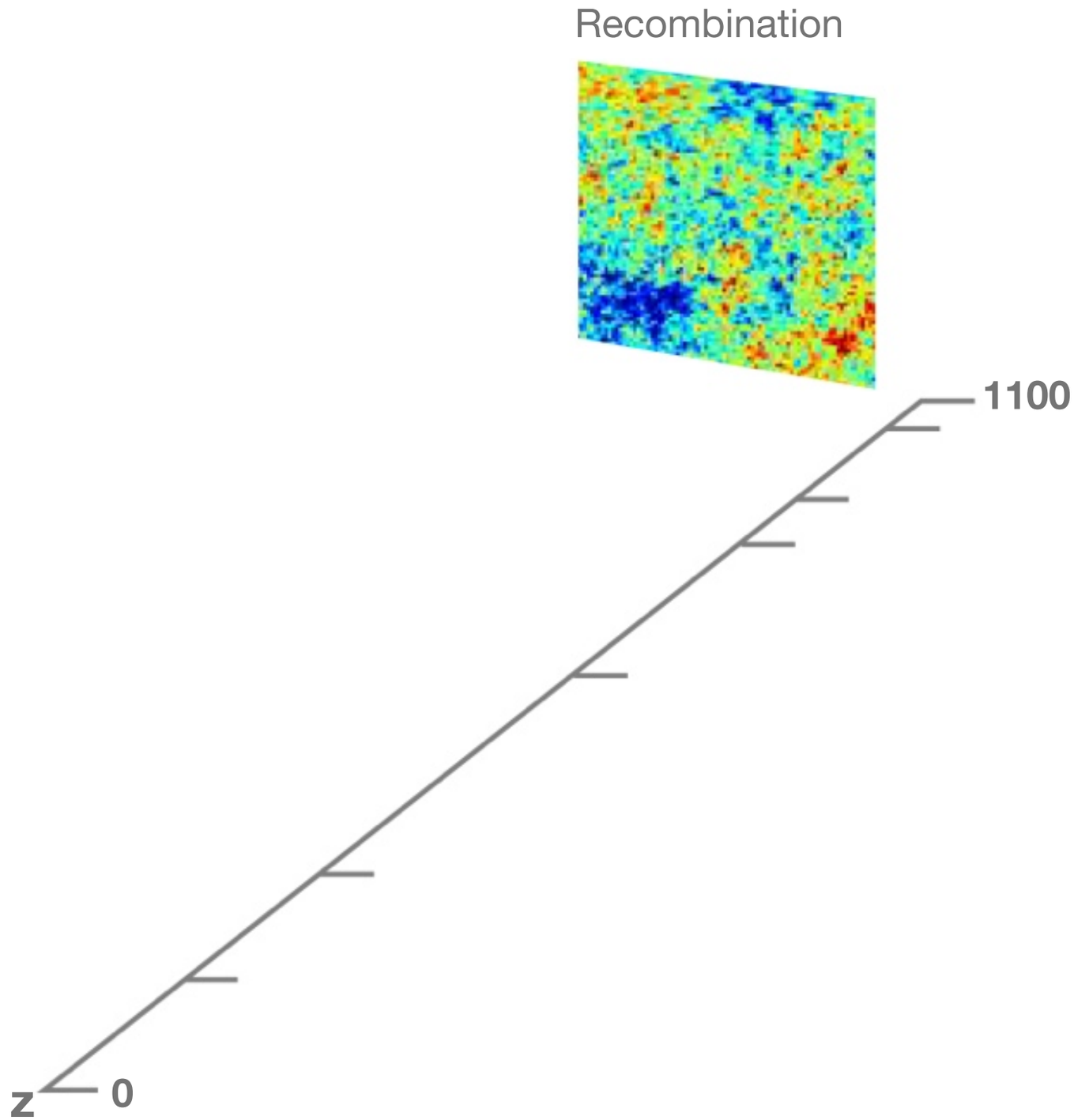

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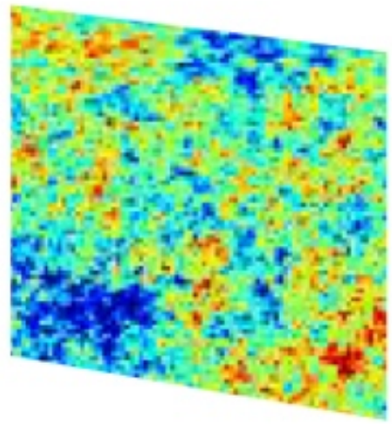

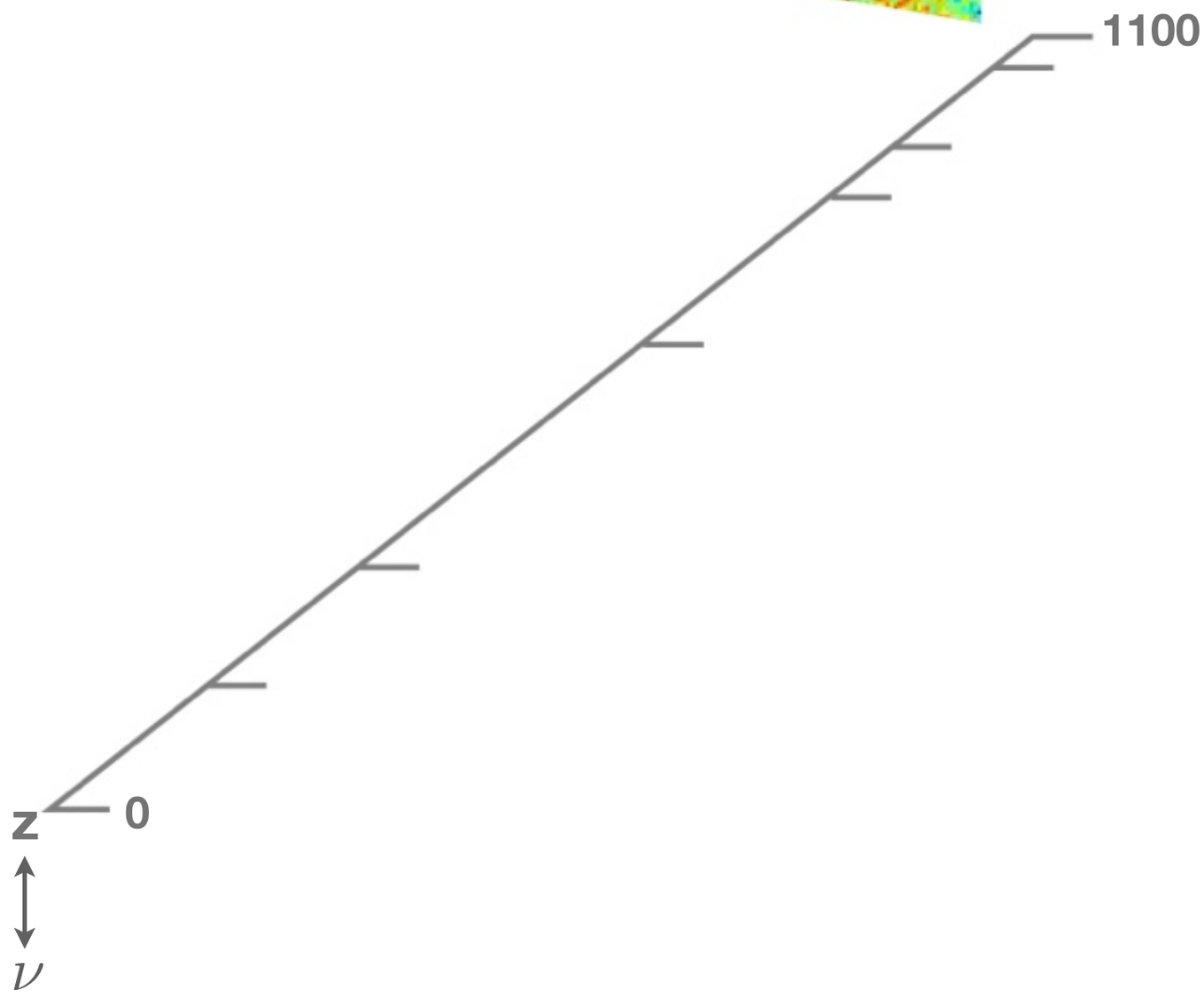

Radio Interferometer

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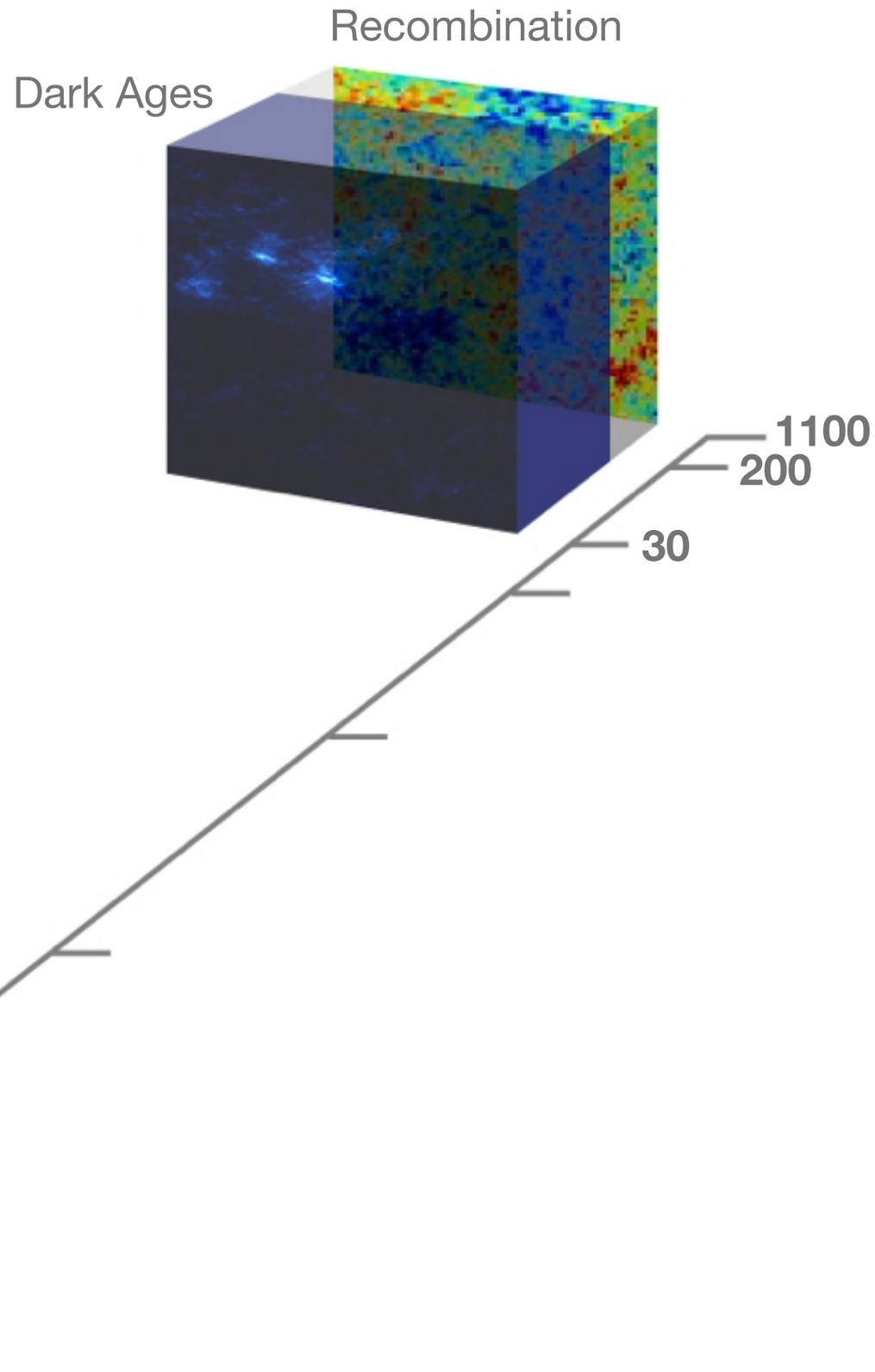

Radio Interferometer

MAB Strategies Elsewhere: 21 cm Fluctuations

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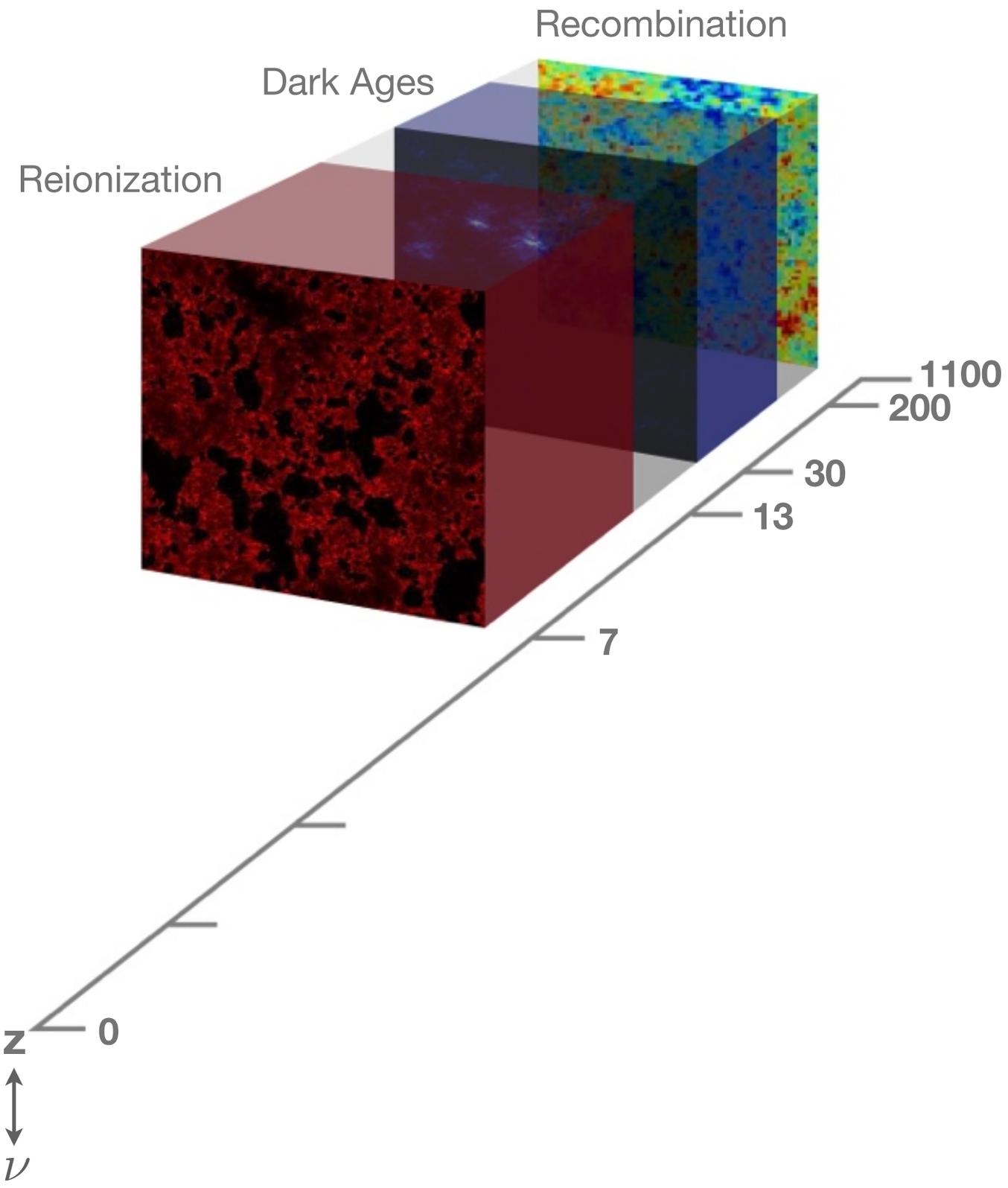

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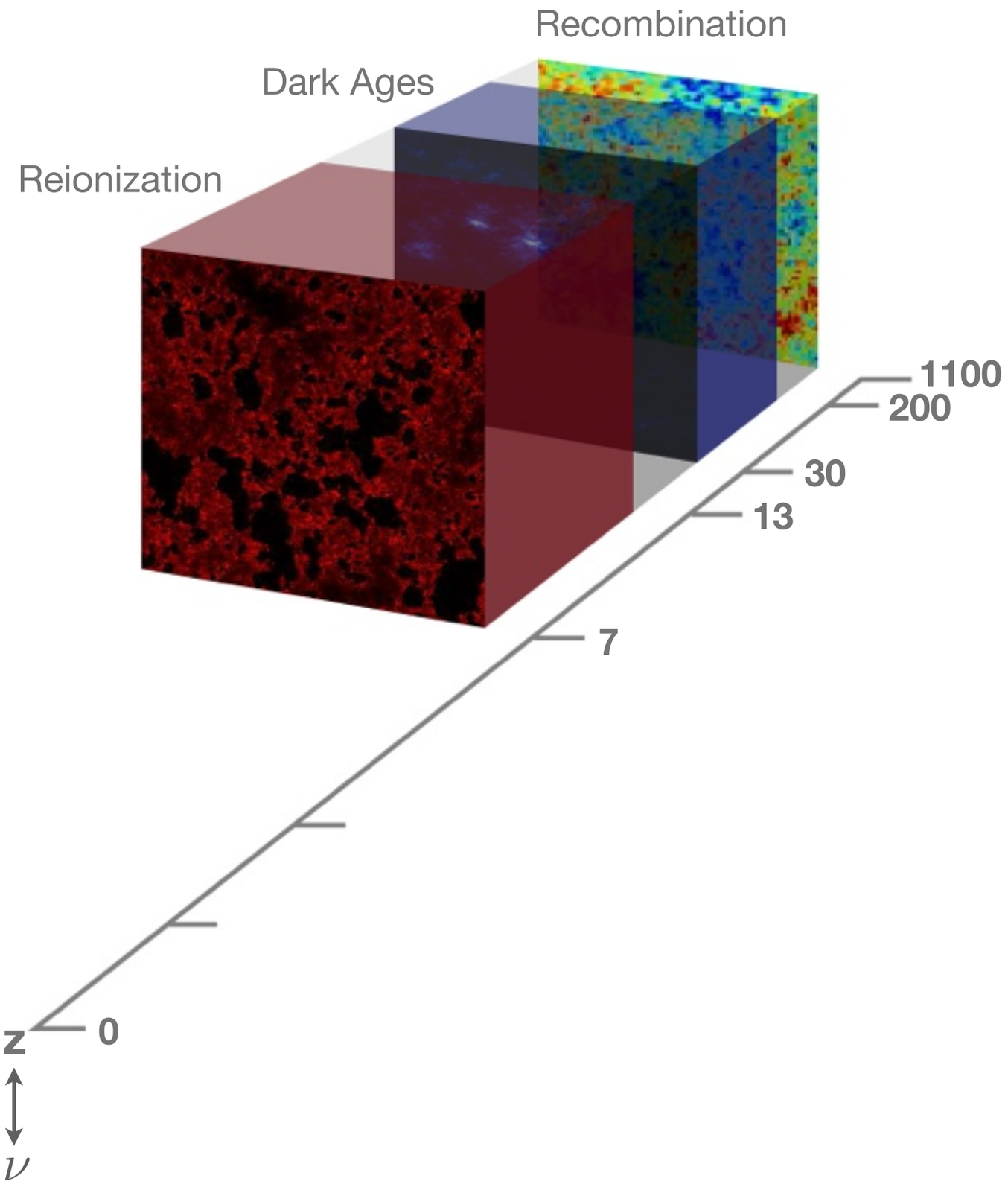
  Adds another dimension.



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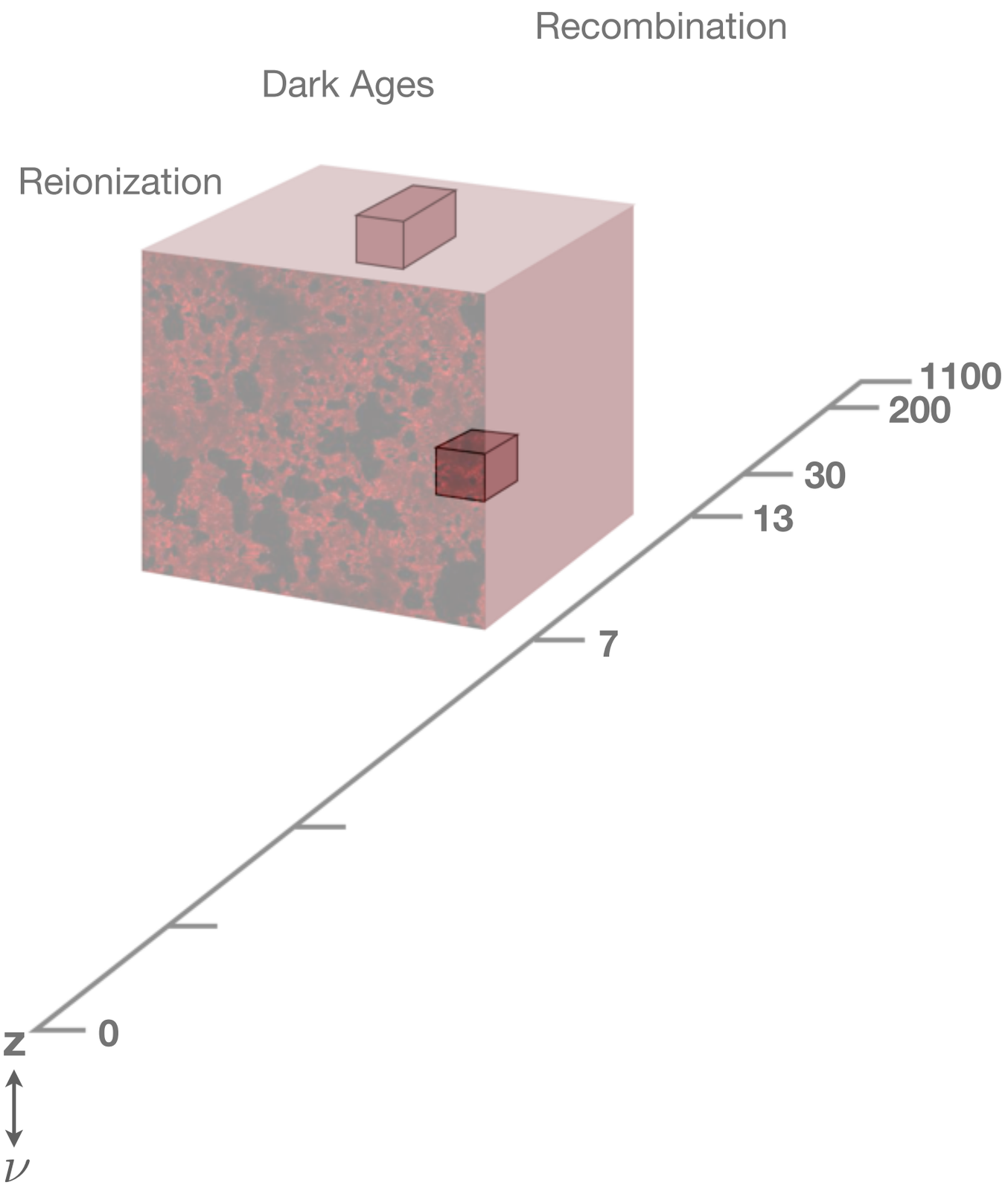

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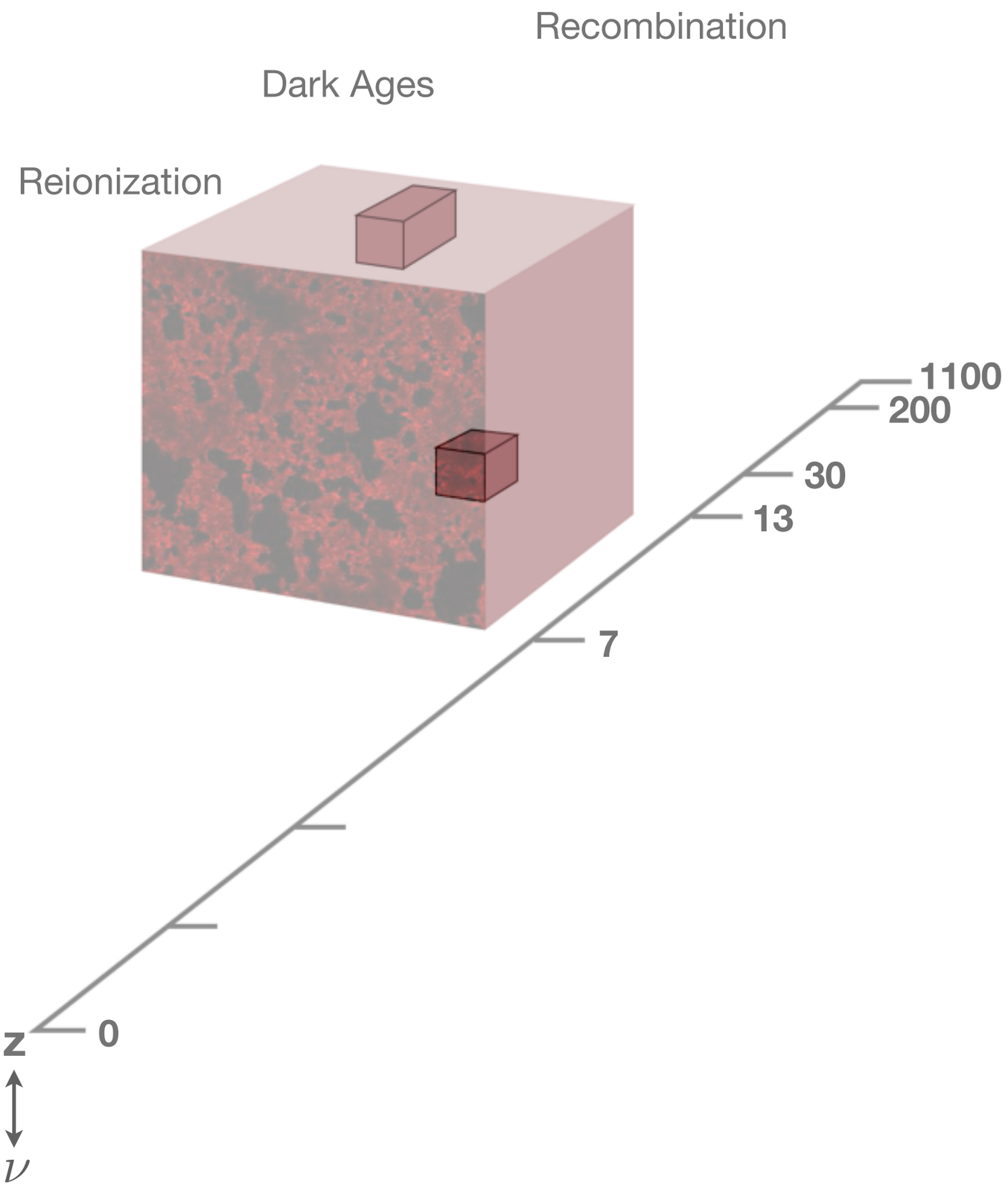
  MWA: Greedy $\epsilon = 0$ vs. 1

  (Thyagarajan et al. arXiv:1308.0565)



Radio Interferometer

MAB Strategies Elsewhere: Imaging Telescopes

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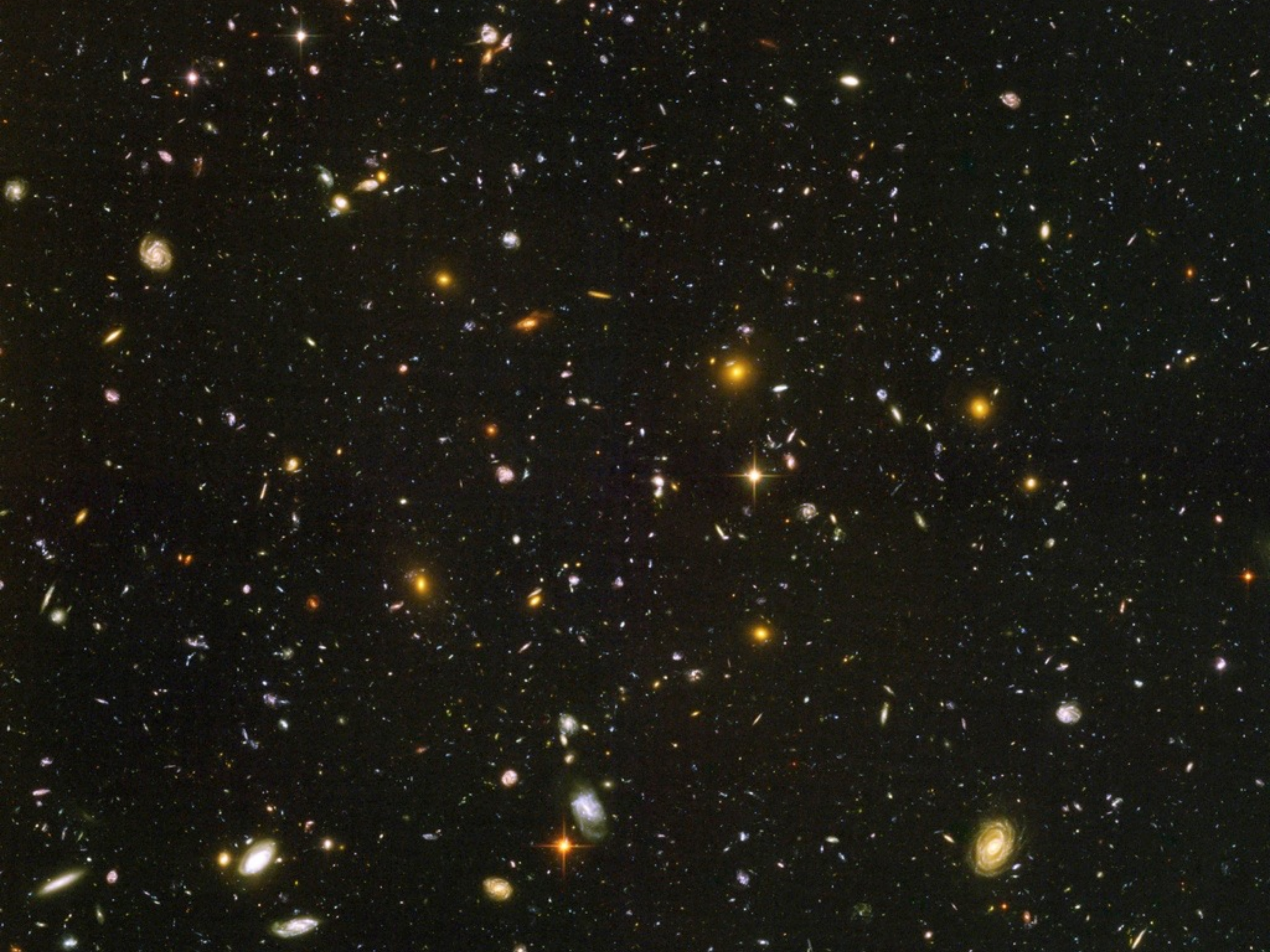
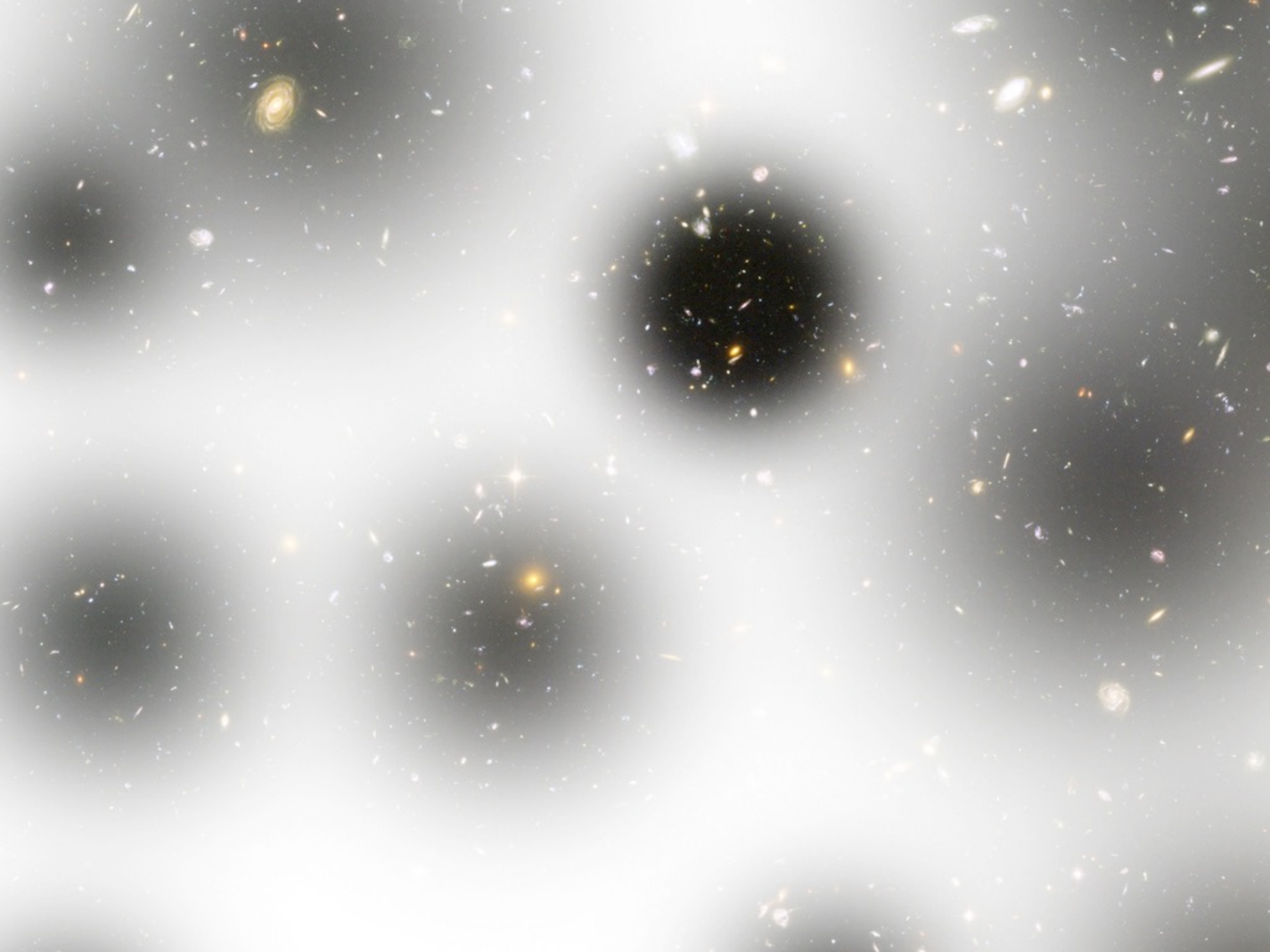
- Deep-field imaging:

  From HST to JWST?





Optimal Patch

Optimal Patch

MAB Strategies Elsewhere: Stellar Mass Function

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Measuring the Luminosity function and calibrating simulations.

MAB Strategies Elsewhere: Stellar Mass Function

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- Cosmic variance uncertainty plays a huge role.

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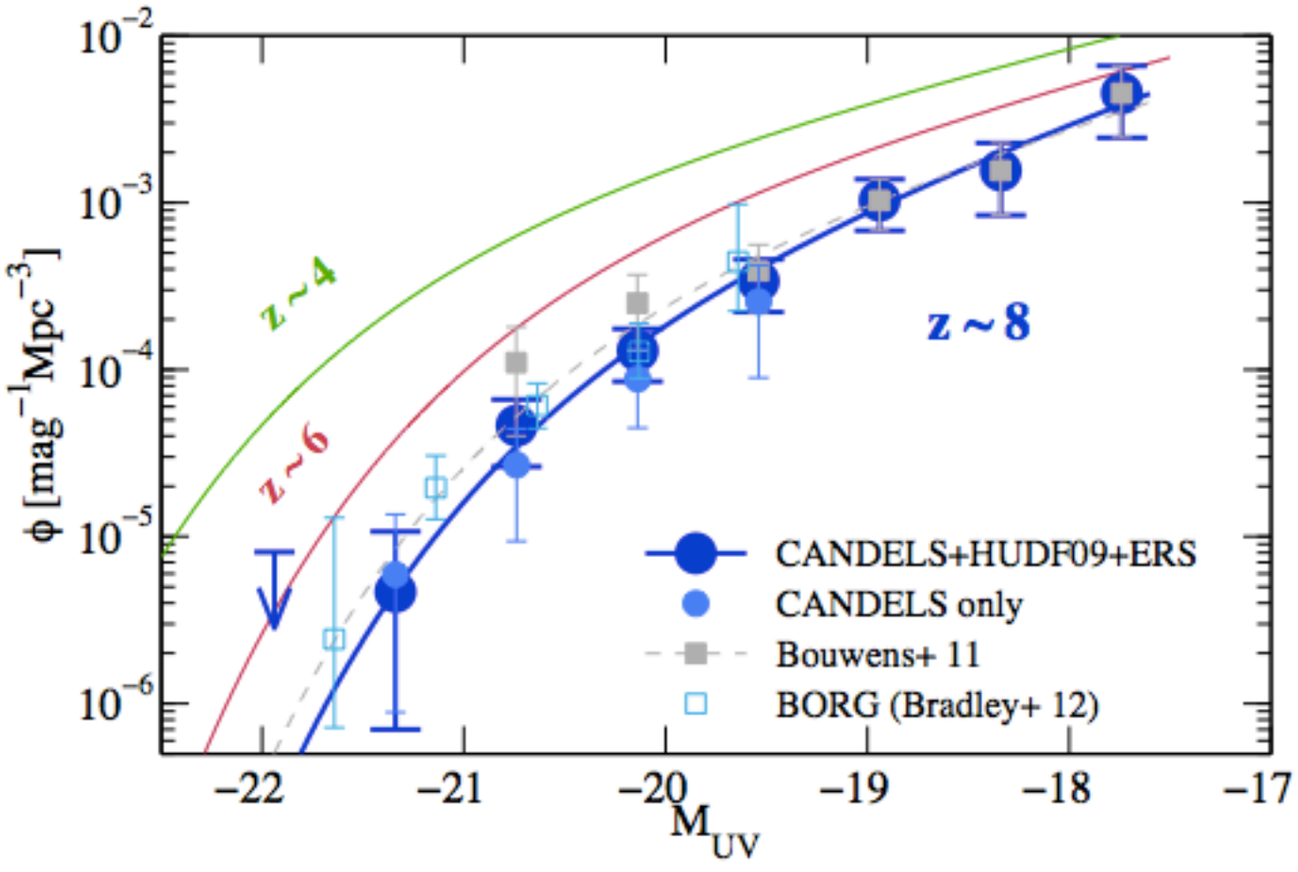
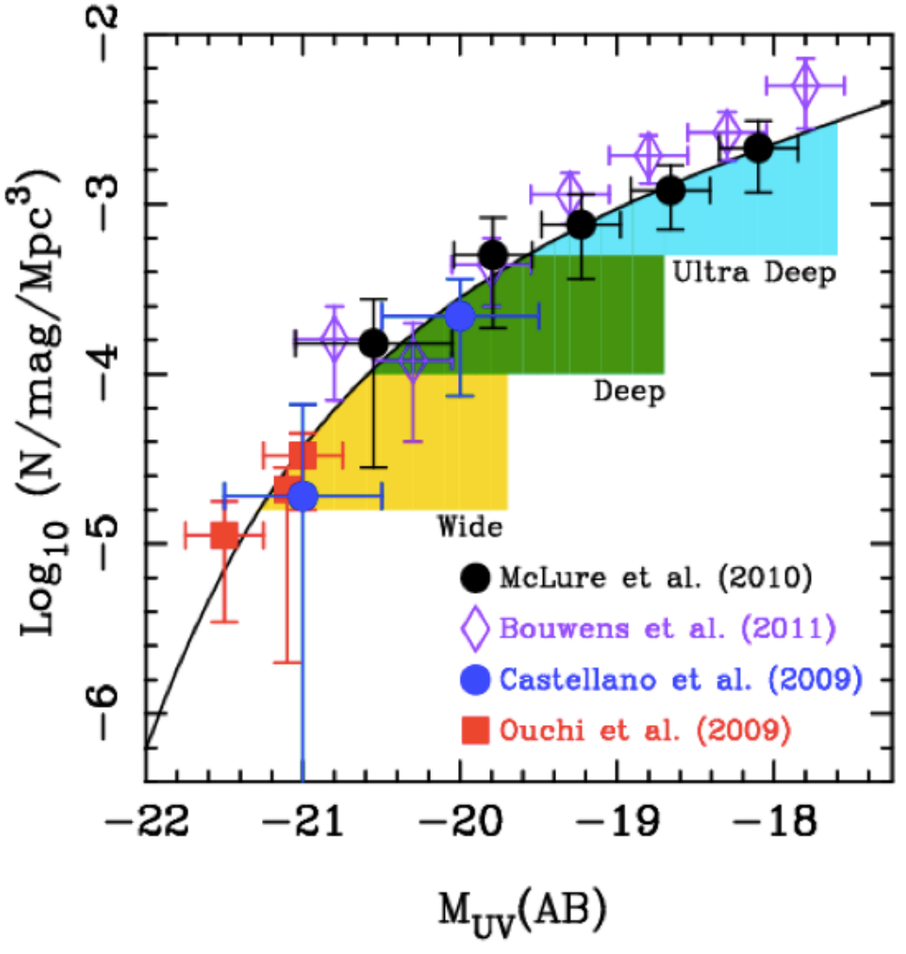
(Oesch et al. arXiv:1201.0755)



(Grogin et al. arXiv:1105.3753)



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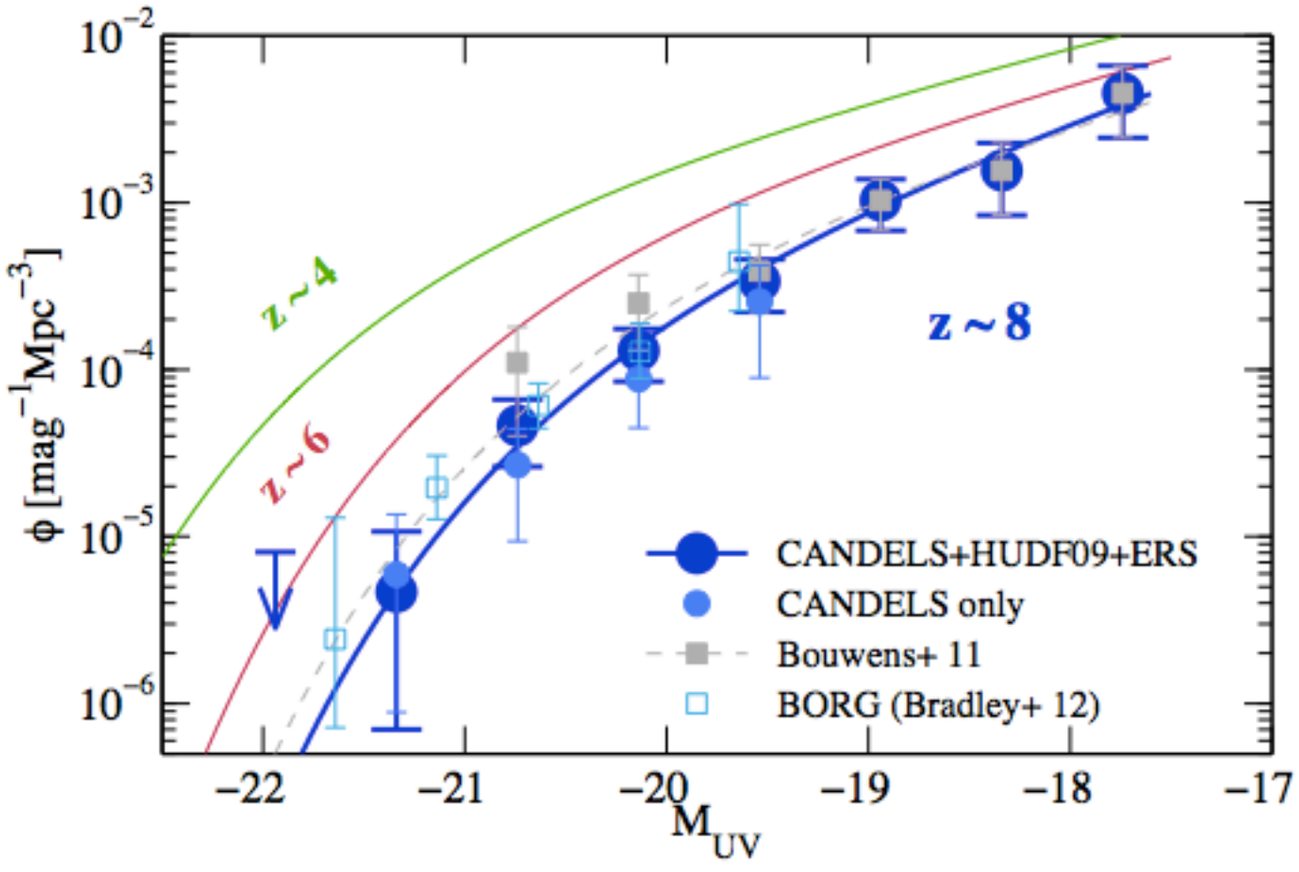

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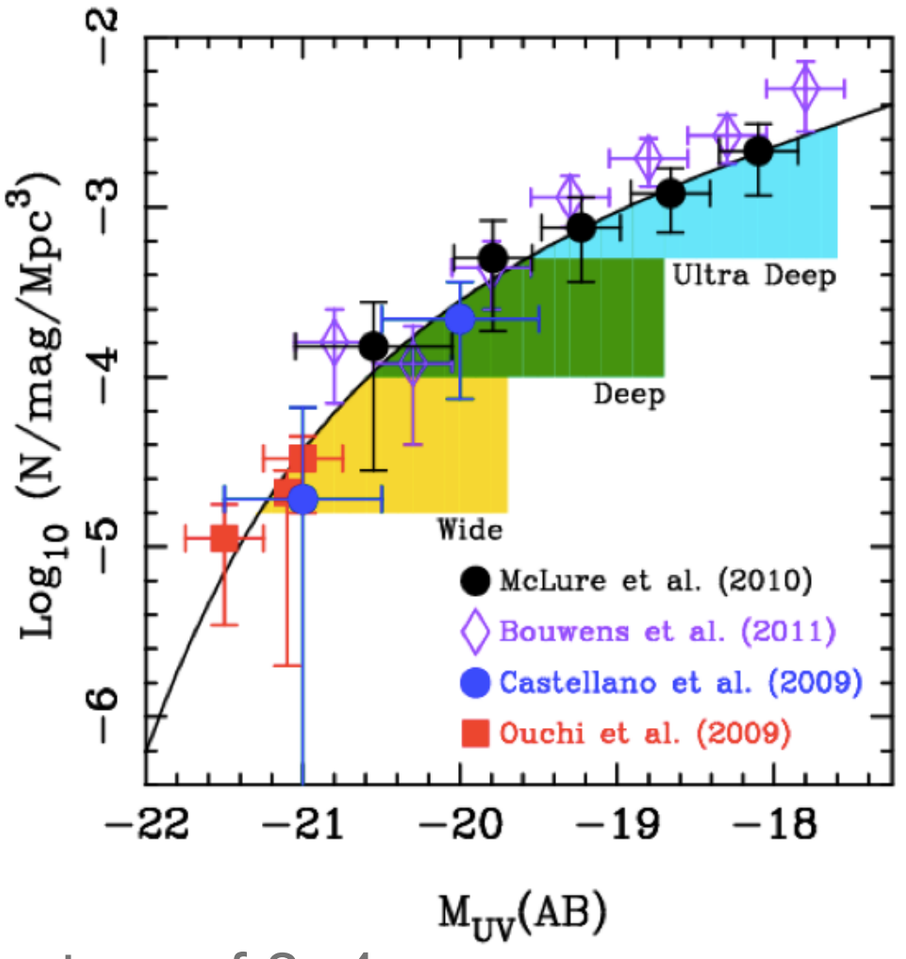

CANDELS fields and HUDF differ at z~7,8 by factors of 3–4.

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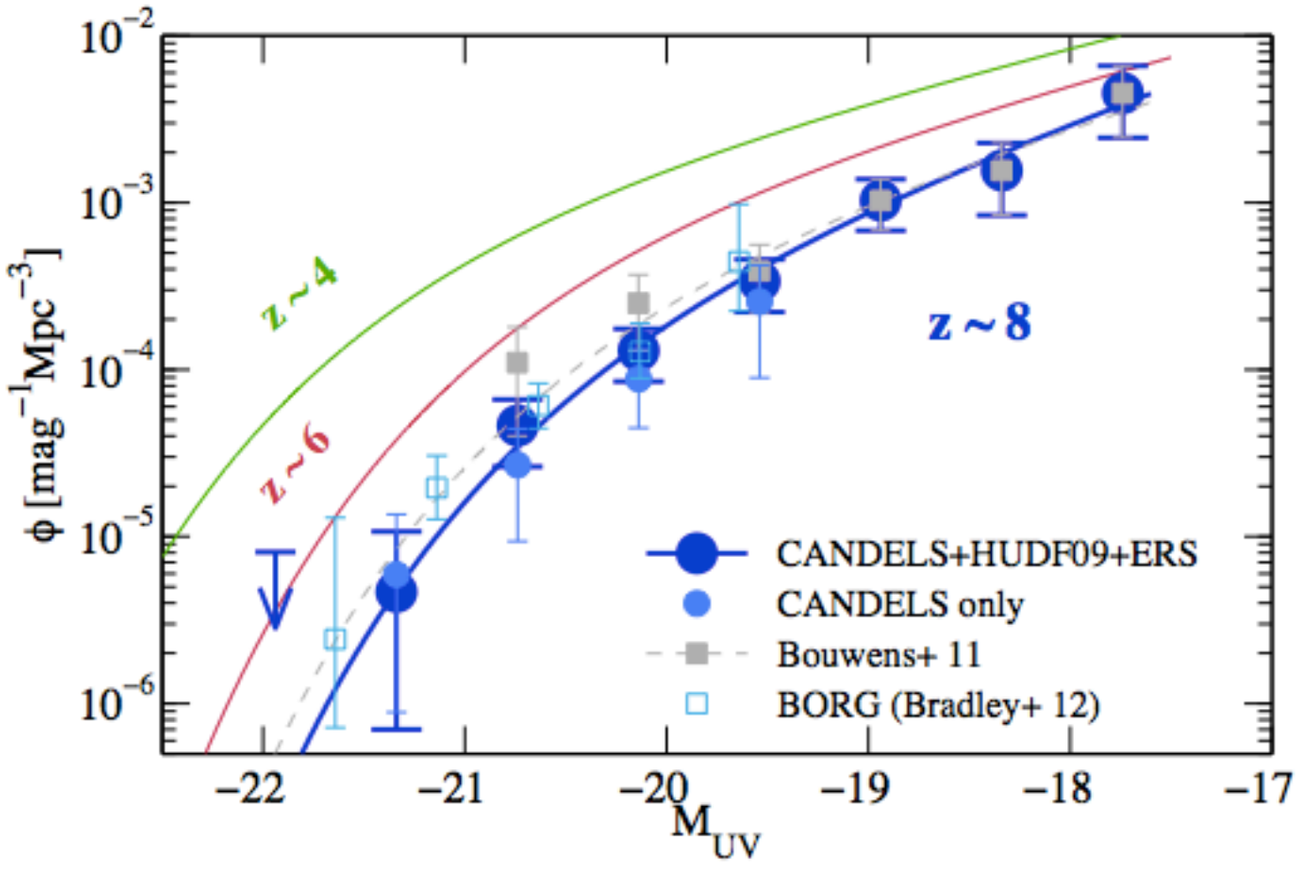

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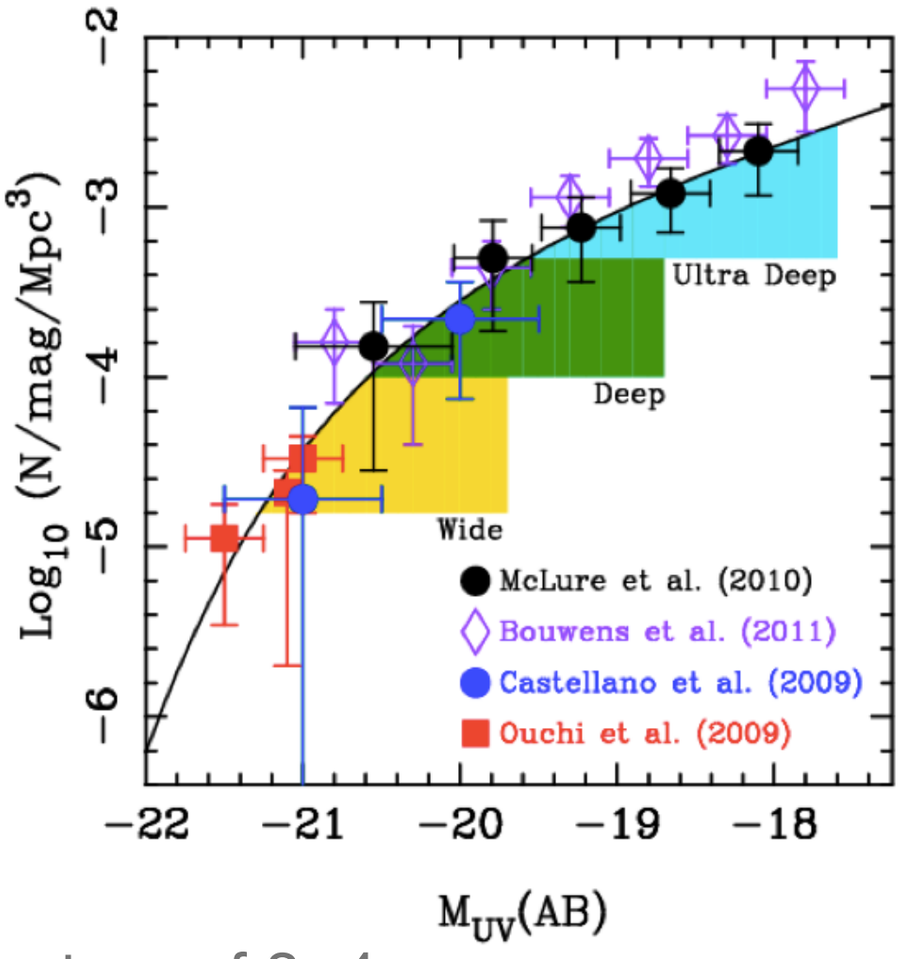

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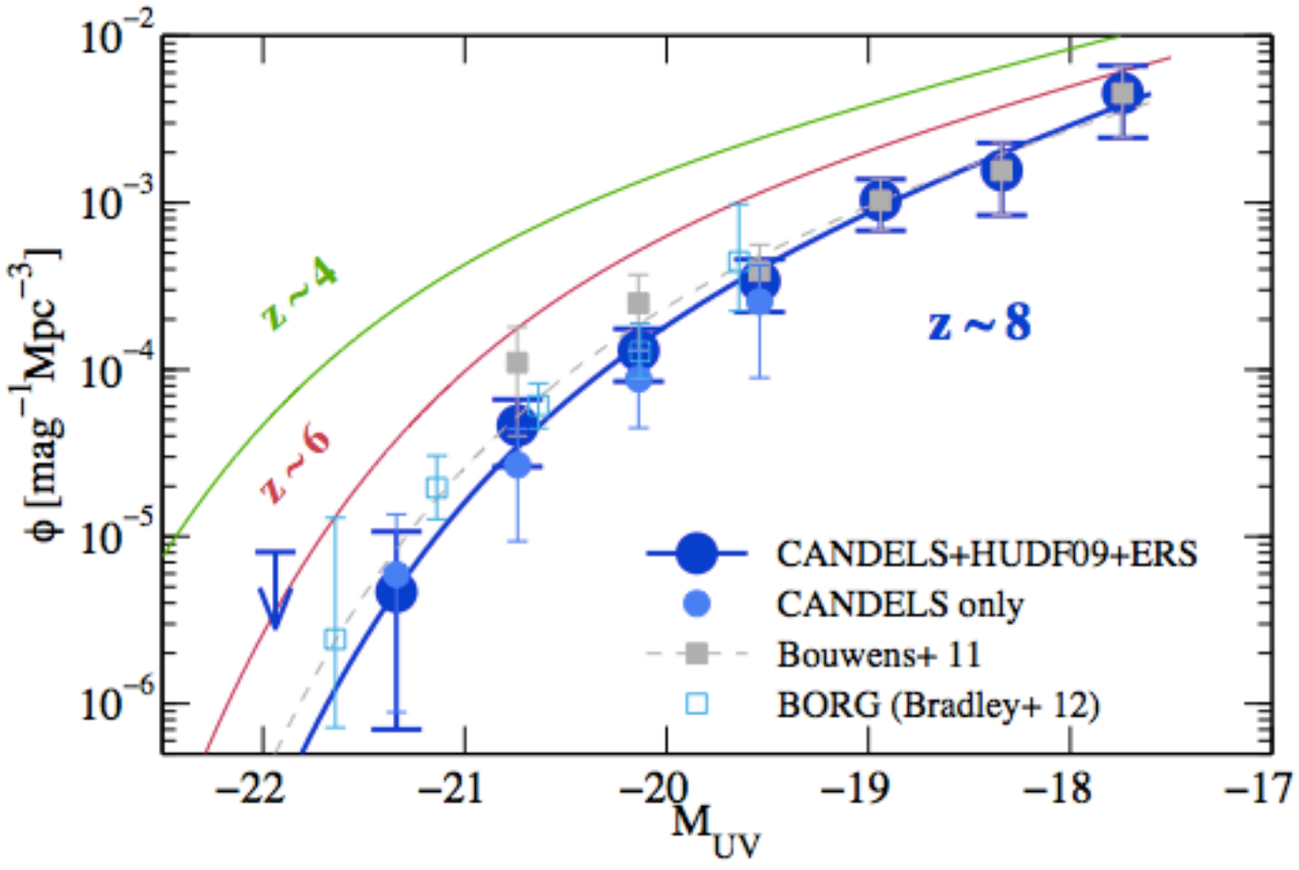

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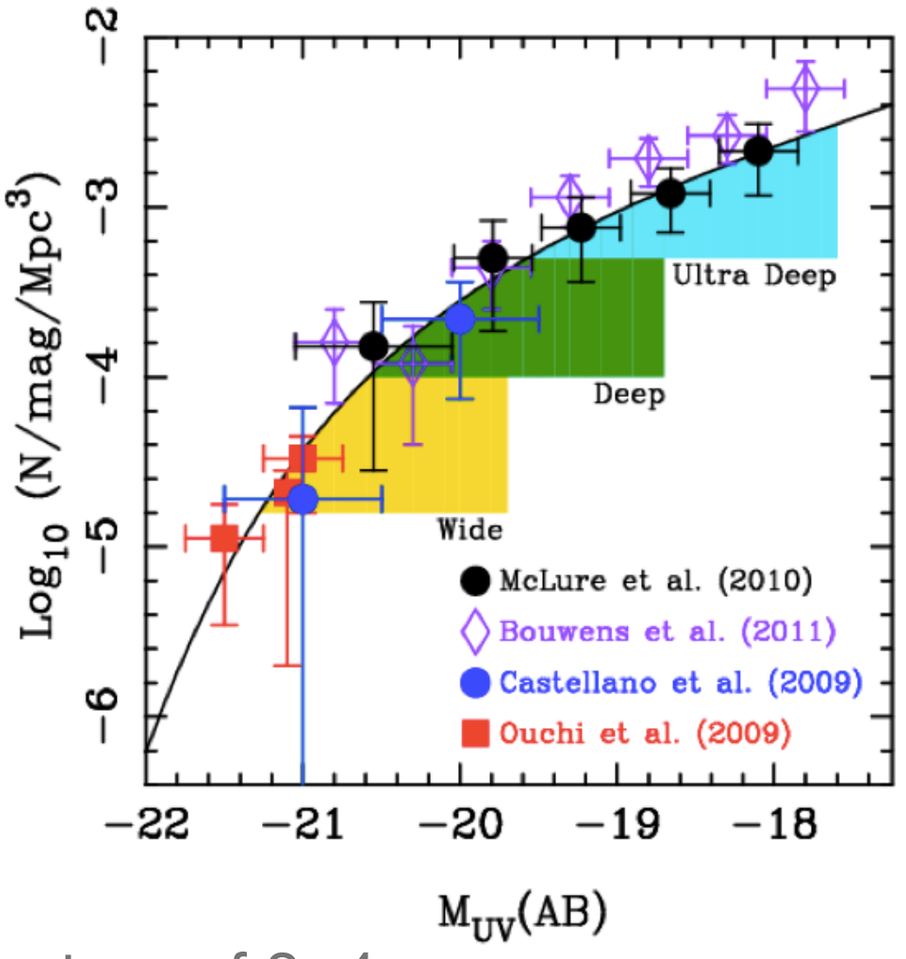

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  (Not useful in a Casino, but may save considerable telescope time)