SPATIALLY-RESOLVED MEASUREMENTS OF NEBULAR PARAMETERS IN AGN INCLUDING ARBITRARY NARROW LINE REGION (NLR) - HII REGION MIXING

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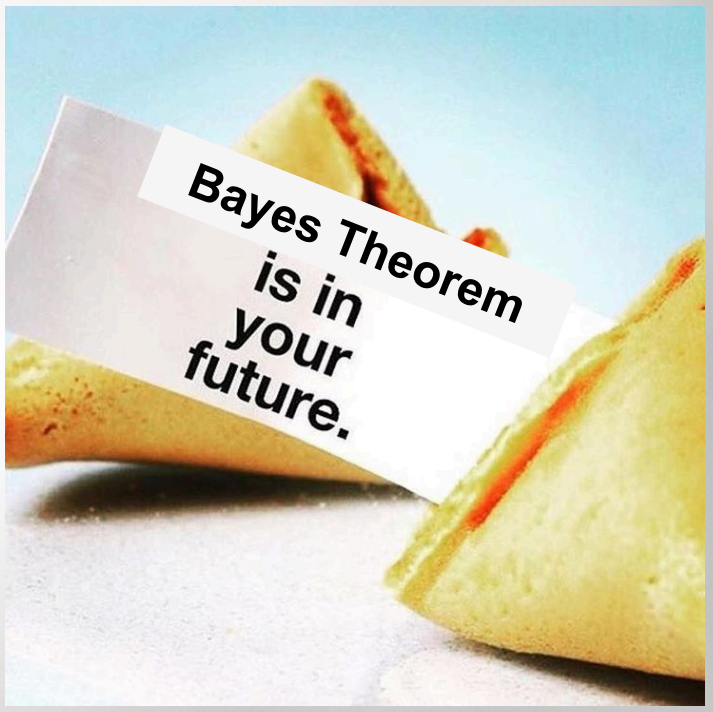
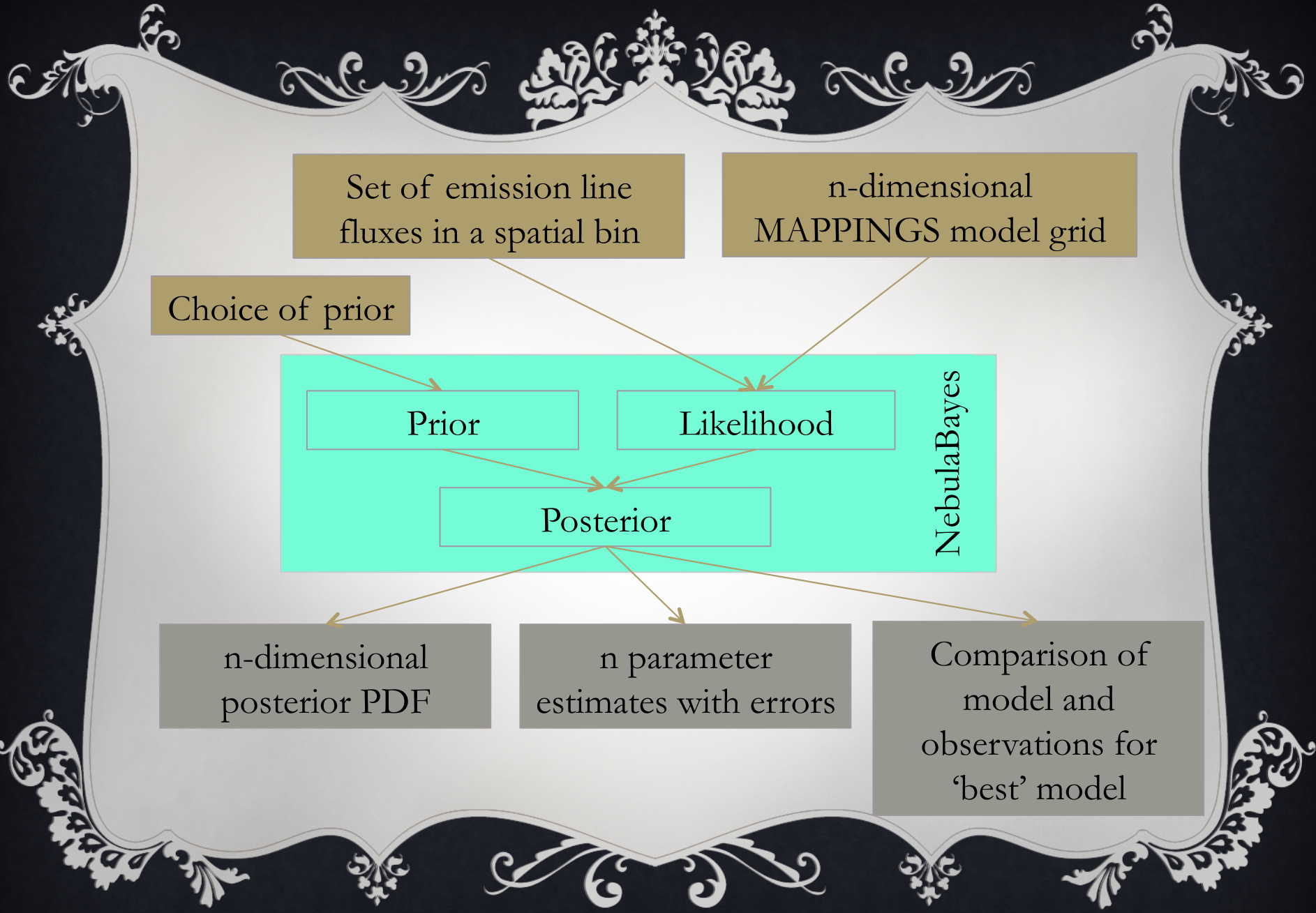
From Black Hole to Environment § August 2017

NEBULABAYES

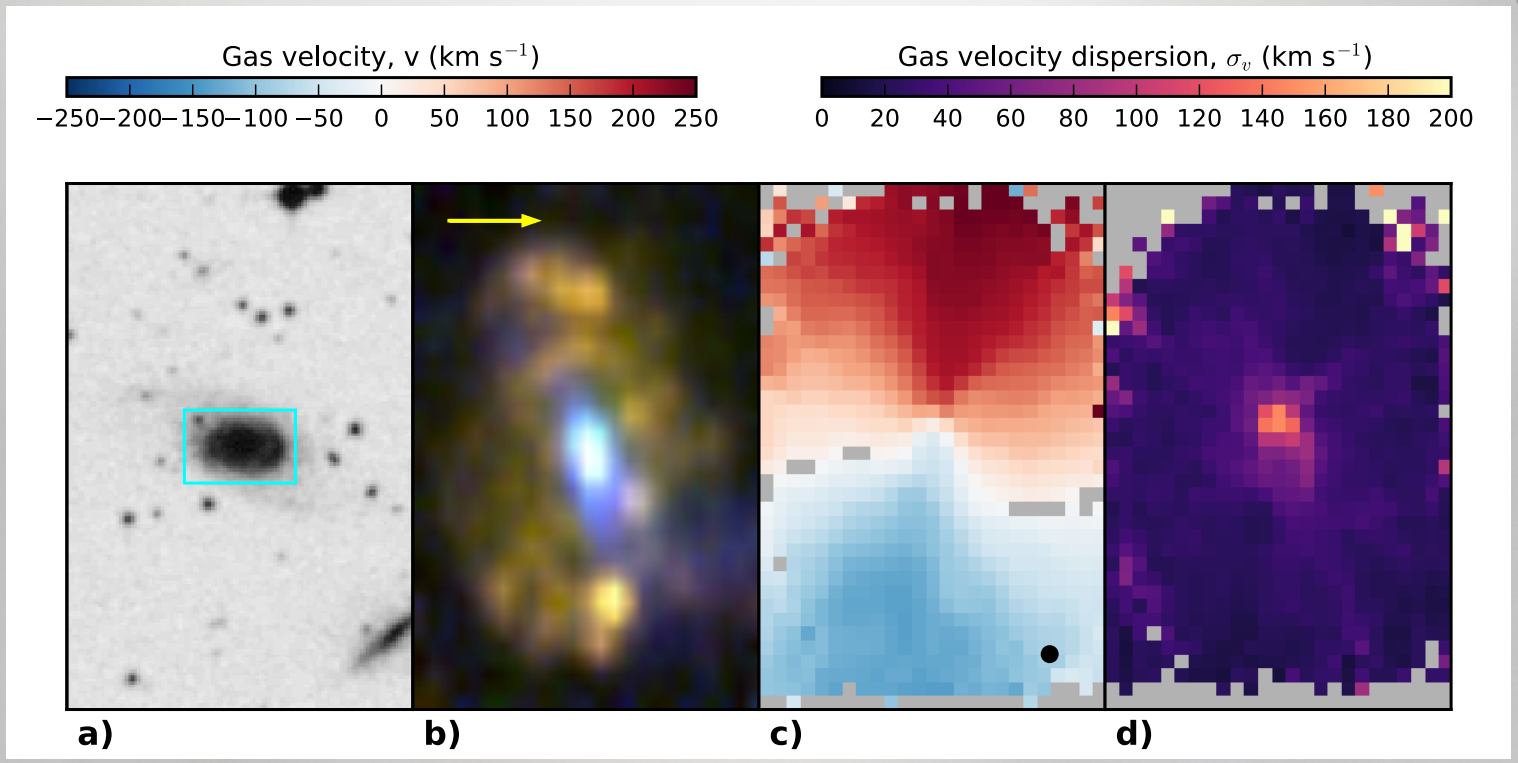
- I've developed a code to compare emission line fluxes with a pre-computed photoionization model grid in arbitrary dimensions, *NebulaBayes*
- *NebulaBayes* compares measured fluxes to the entire model grid at once, and generalises the code IZI (Blanc et al. 2015)

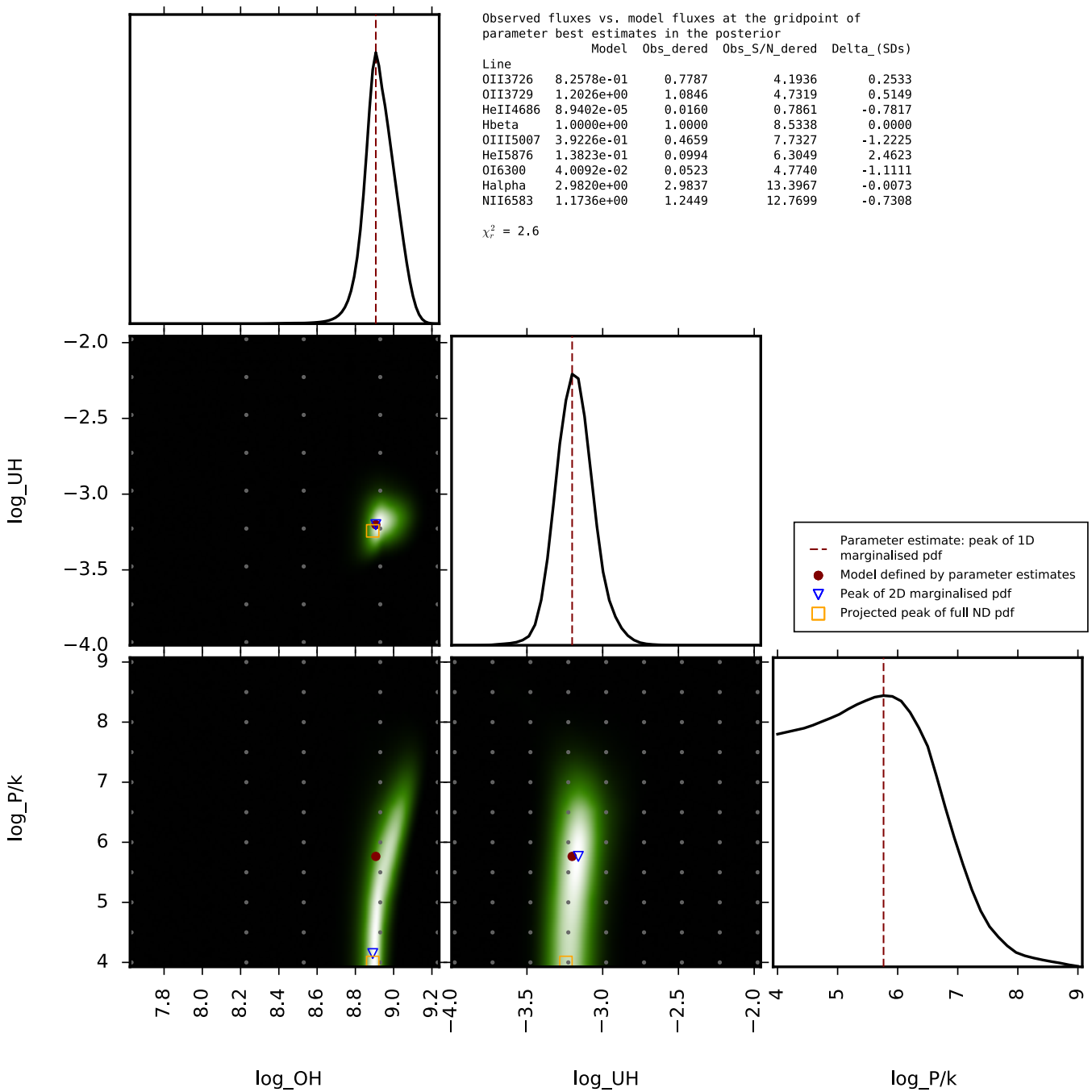


Blanc, G. A., Kewley, L., Vogt, F. P. A., & Dopita, M. A. 2015, ApJ, 798, 99

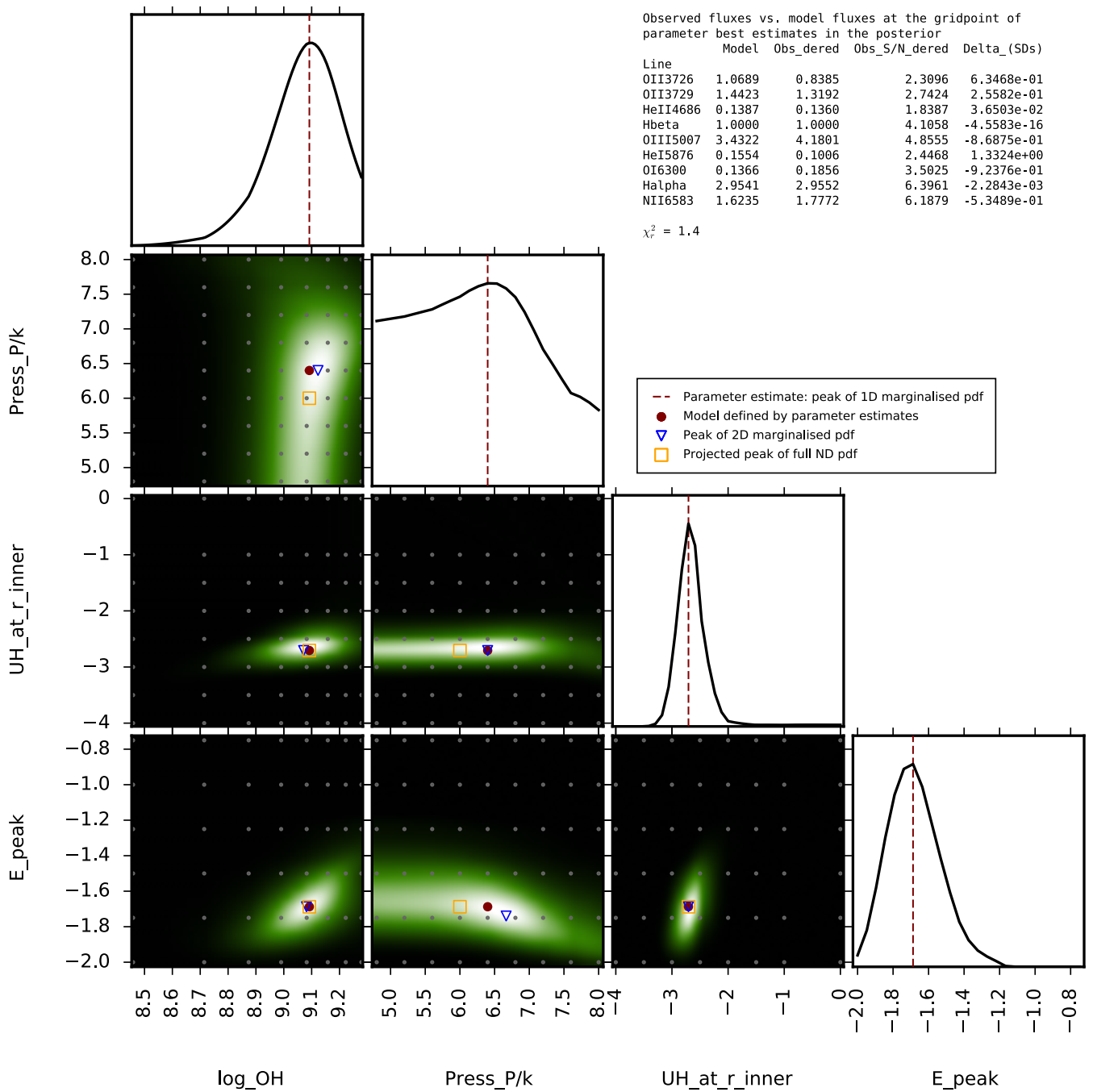

Set of emission line fluxes in a spatial bin
n-dimensional MAPPINGS model grid
Choice of prior
Prior
Likelihood
Posterior
NebulaBayes
n-dimensional posterior PDF
n parameter estimates with errors
Comparison of model and observations for 'best' model

❖ I'm using *NebulaBayes* to study the S7 galaxy MCG-02-51-008





- NebulaBayes results for an HII-region-classified Voronoi bin
- The line fluxes were compared to an HII-region model grid



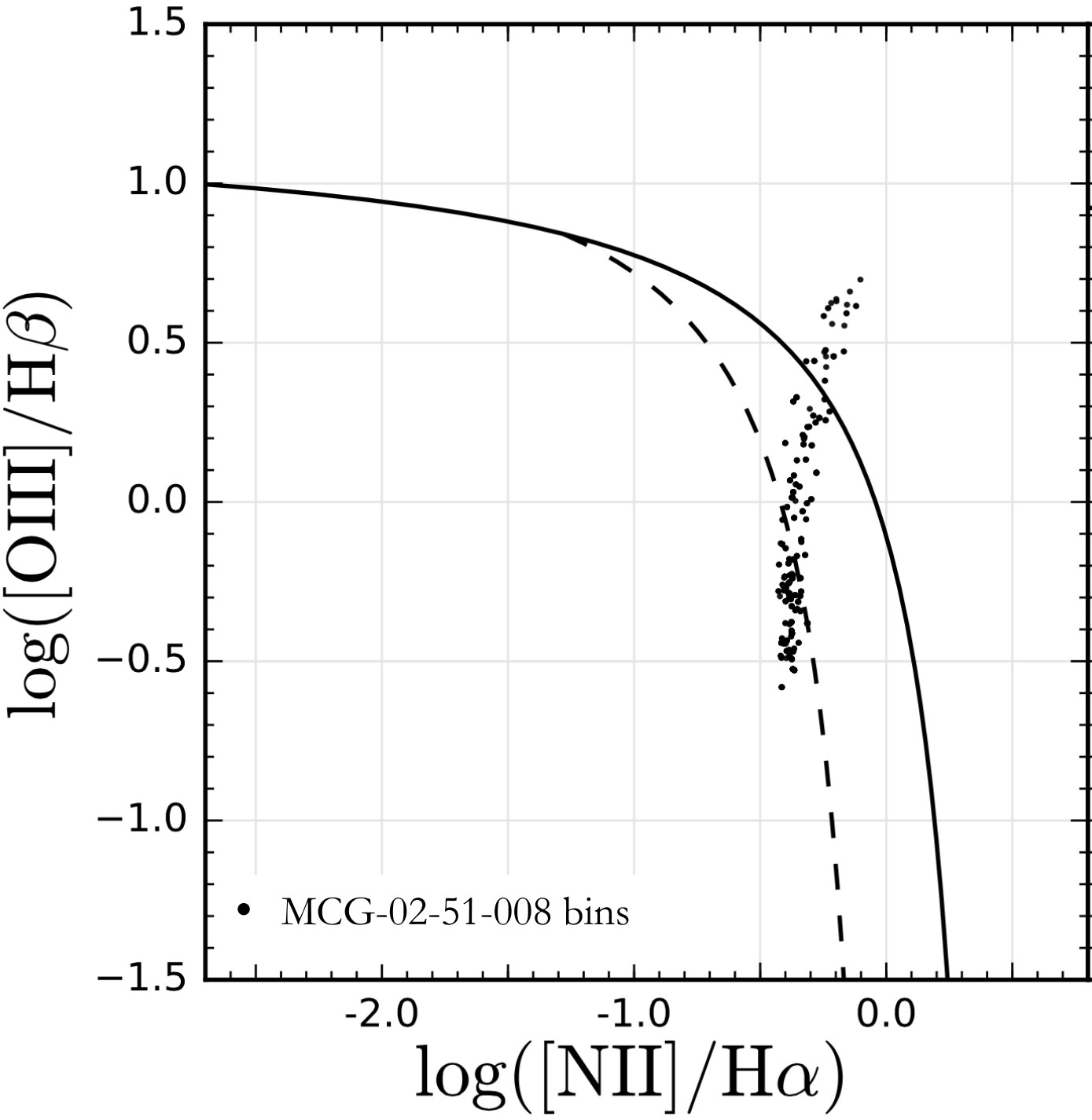
- NebulaBayes results for a NLR-region-classified Voronoi bin
- The line fluxes were compared to a NLR model grid

❖ PROBLEM: MCG-02-51-008 shows a clean ‘mixing sequence’ between ‘pure HII region’ and ‘pure AGN’ line ratios

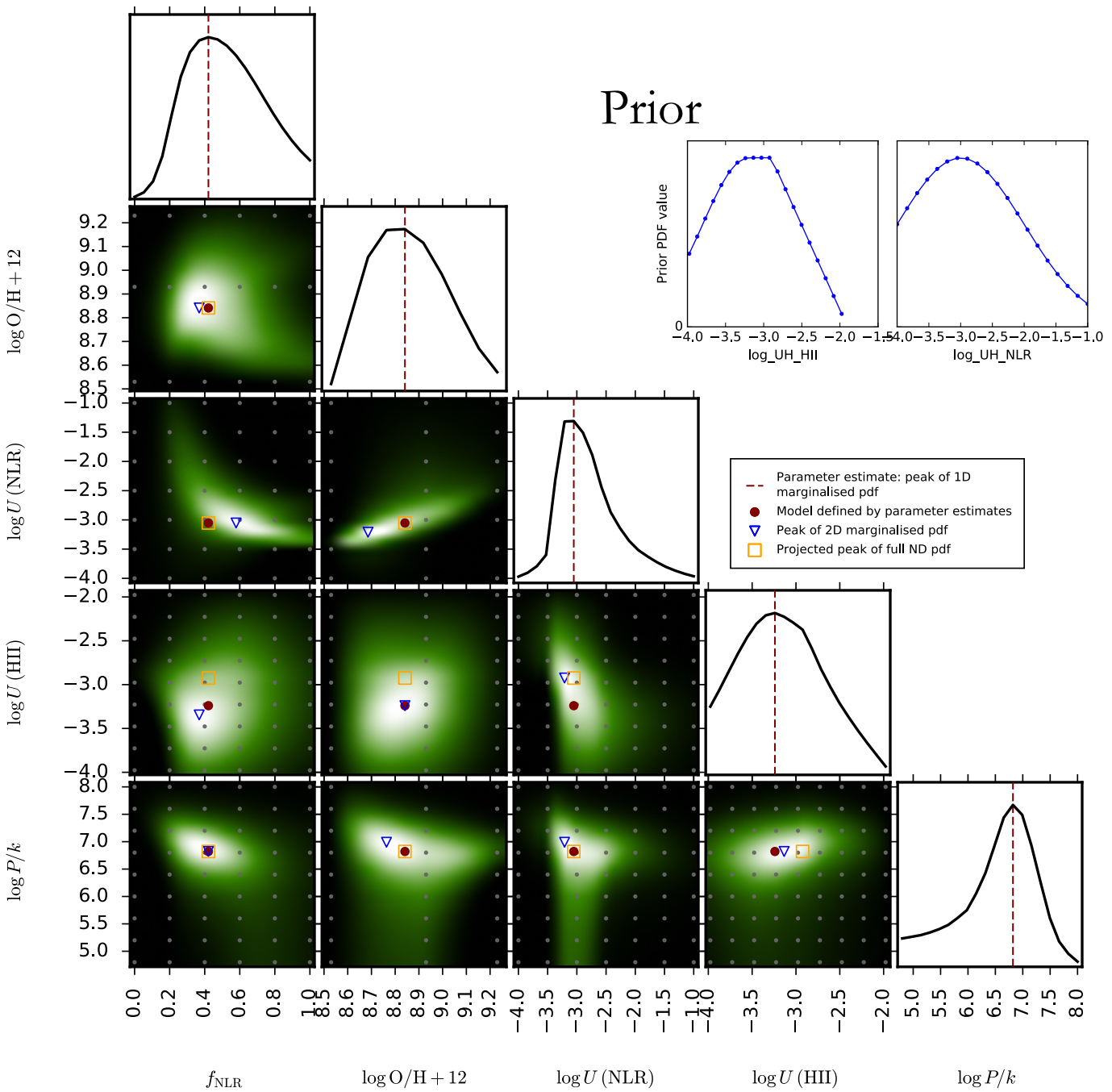
❖ We can only use bins at the extremes of this sequence

❖ But these bins might also be ‘contaminated’…

❖ Can we come up with a general way to fit models with arbitrary HII-NLR mixing?



- Define a ‘mixing’ grid with arbitrary mixing between HII and NLR models
- Assume the same metallicity, pressure and reddening for the HII and NLR components for each gridpoint in the ‘mixing’ grid



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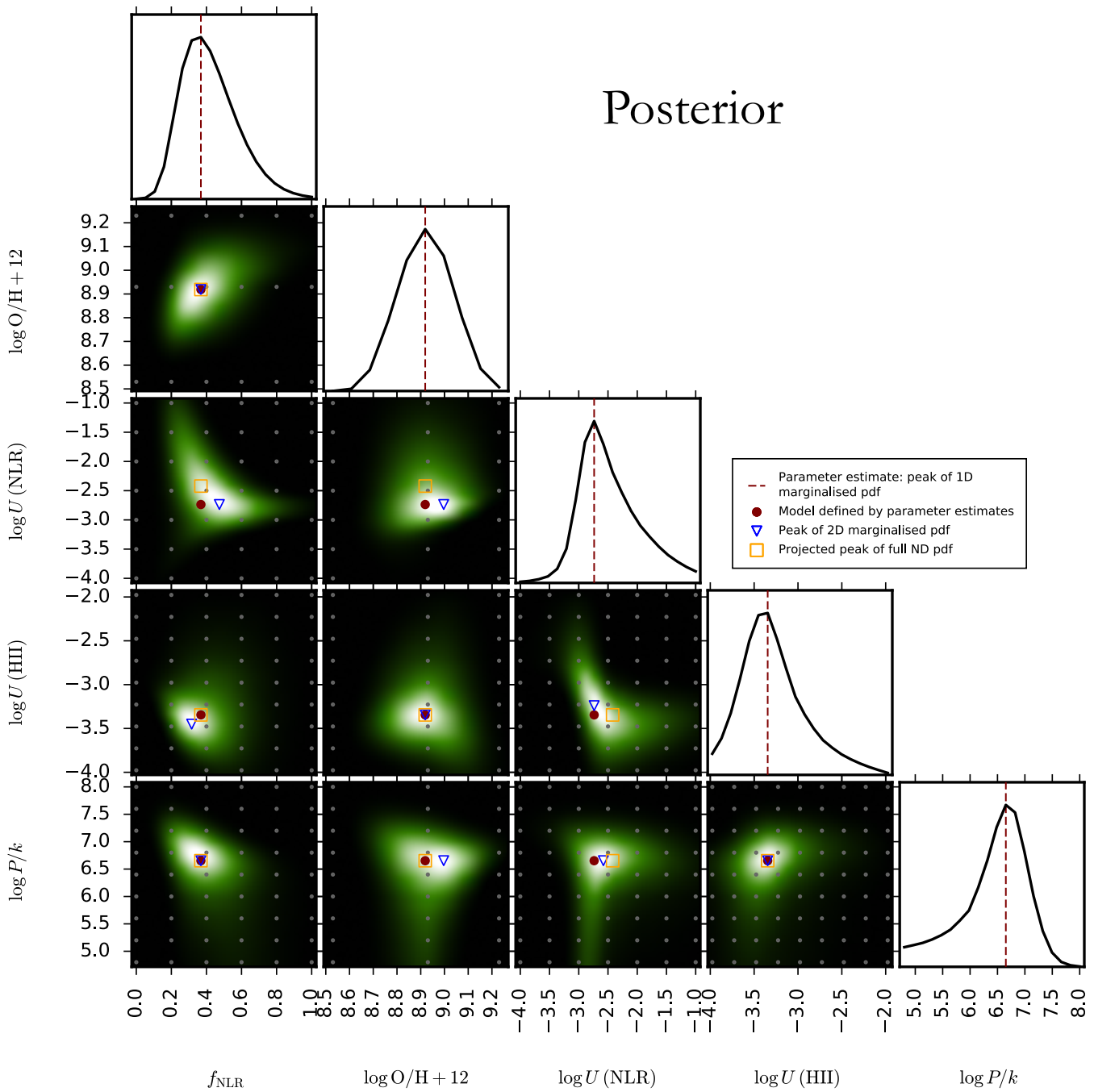
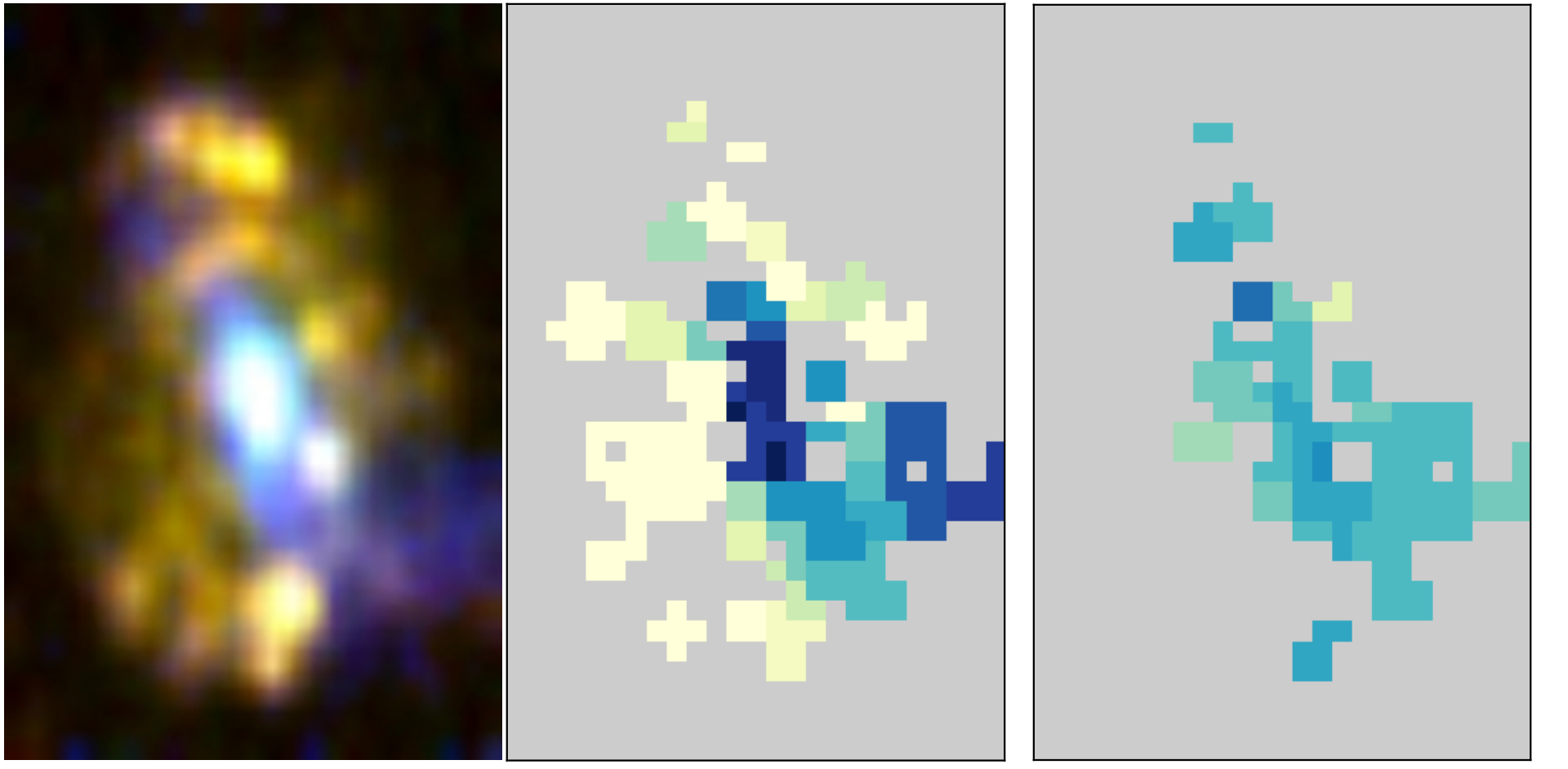
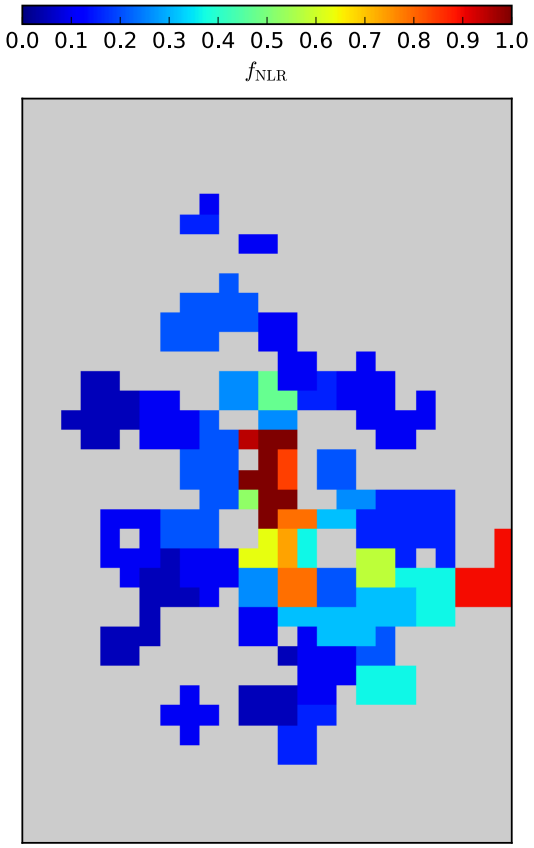


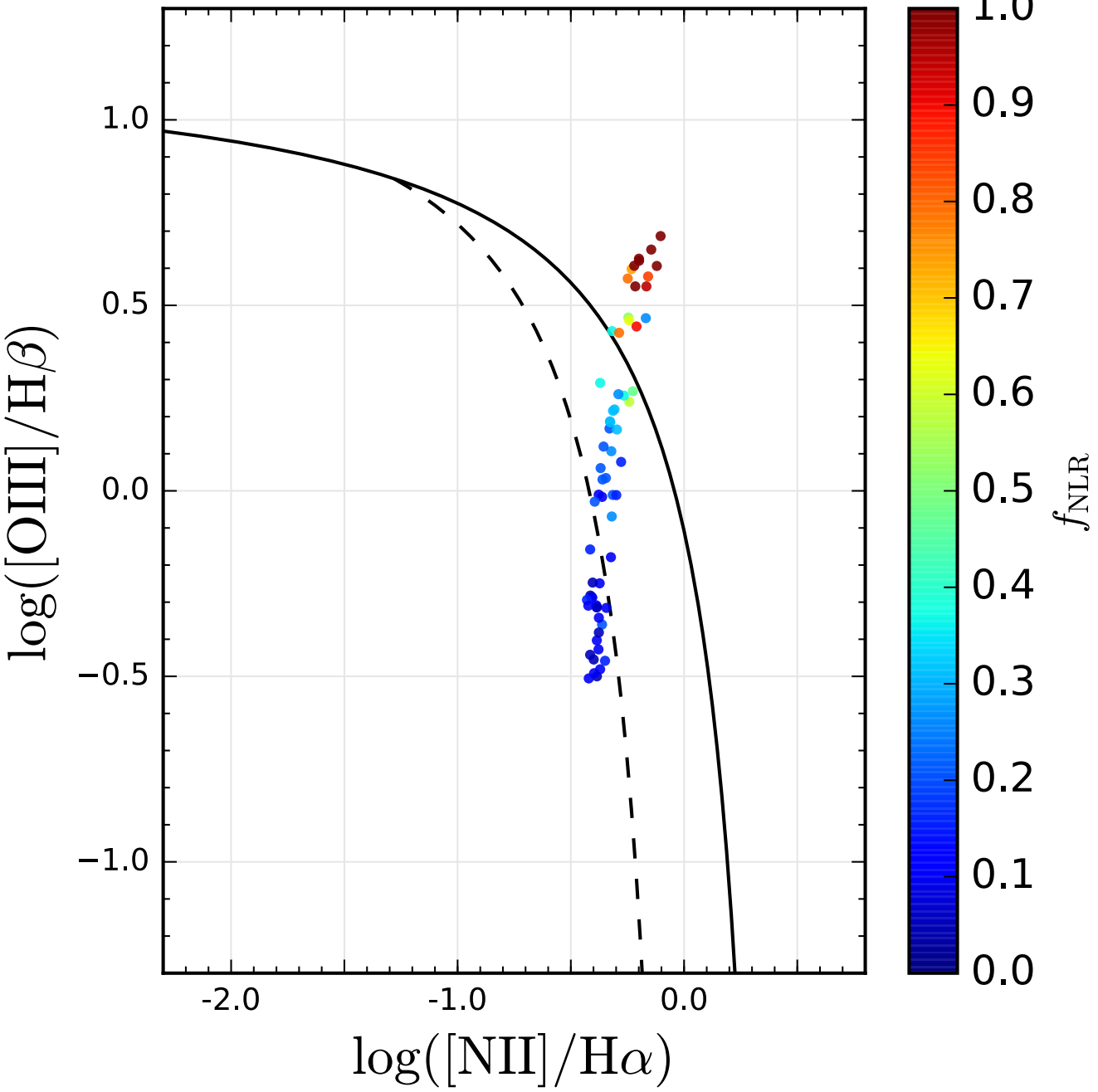
- Define a ‘mixing’ grid with arbitrary mixing between HII and NLR models
- Assume the same metallicity, pressure and reddening for the HII and NLR components for each gridpoint in the ‘mixing’ grid
- Results show promise, but there are issues to be resolved…

Maps of the results are very promising!



❖ The estimates for the ‘mixing’ parameter look excellent!





IN CONCLUSION

- The code NebulaBayes shows great promise to allow measurement of physical parameters with HII-NLR mixing
- Outstanding issues include handling the degeneracy between Epeak and f_NLR
- We expect to use this or a similar method to systematically measure Epeak and metallicity in S7 nuclei