Making the best of the data:
discrete dynamical modelling of Omega Centauri

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MPIA, Heidelberg

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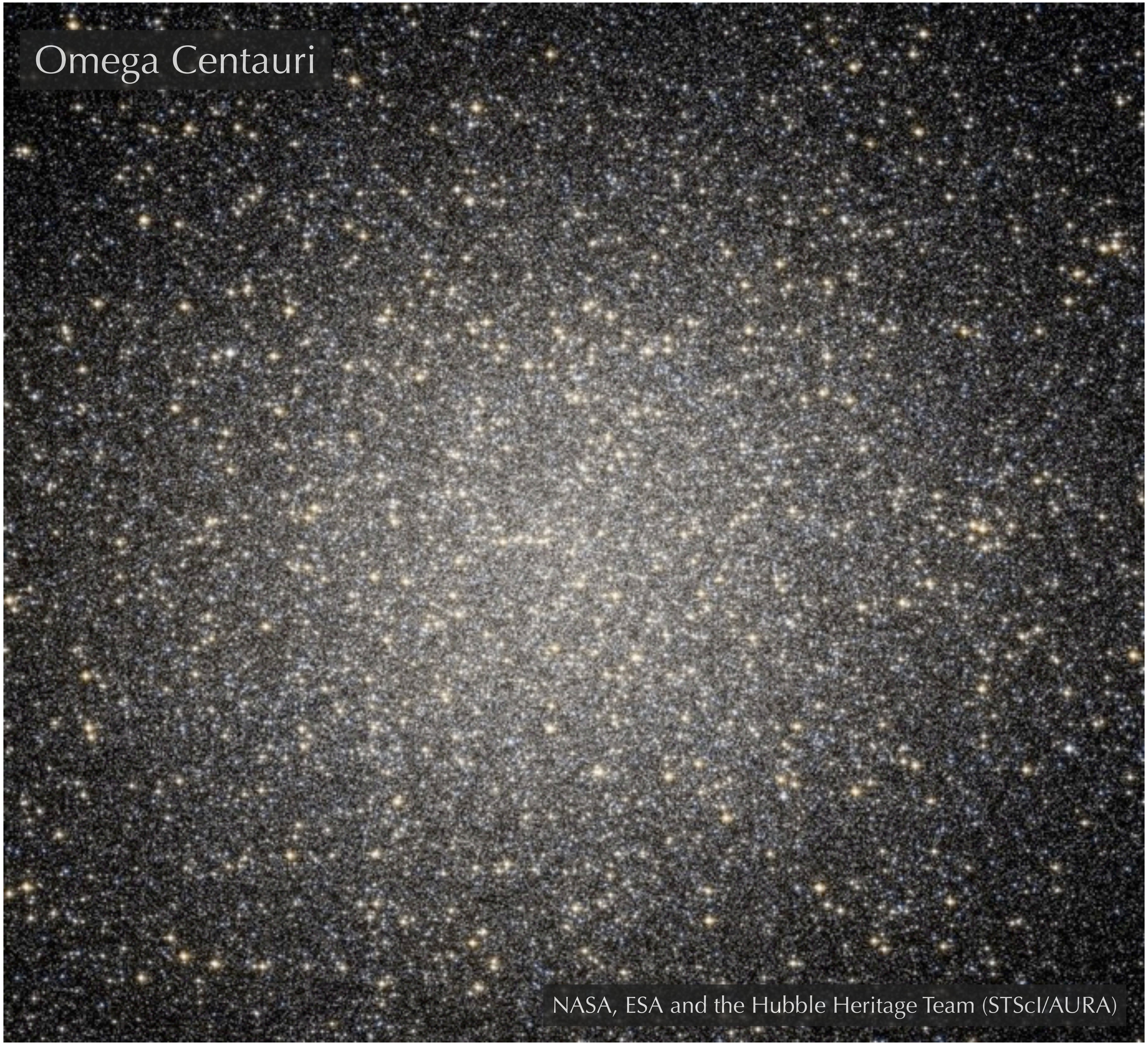
Mark den Brok, Alex Büdenbender

Dynamics meets kinematic tracers, Ringberg, 12 April 2012


Omega Centauri
NASA, ESA and the Hubble Heritage Team (STScI/AURA)

Omega Centauri is interesting



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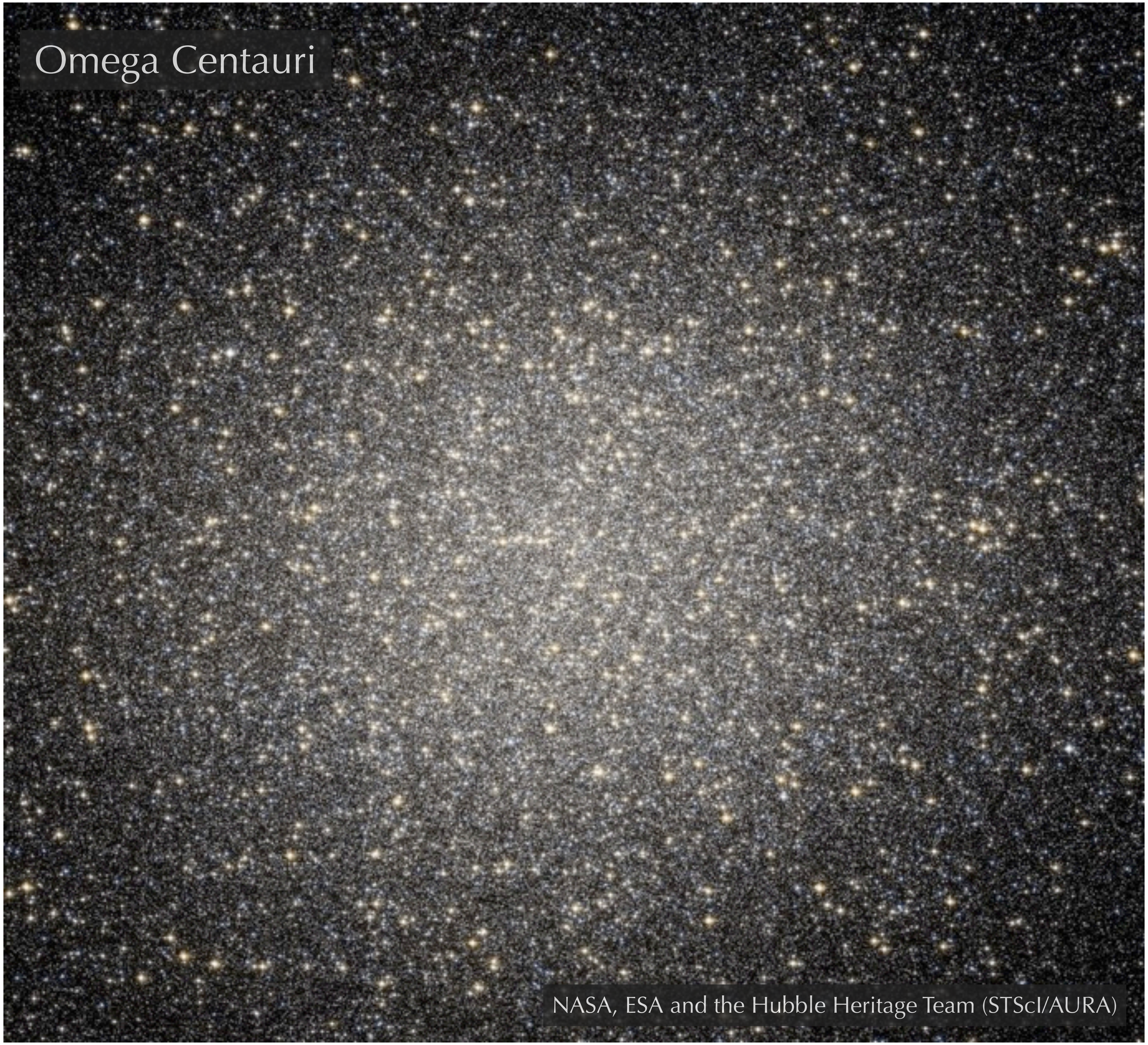

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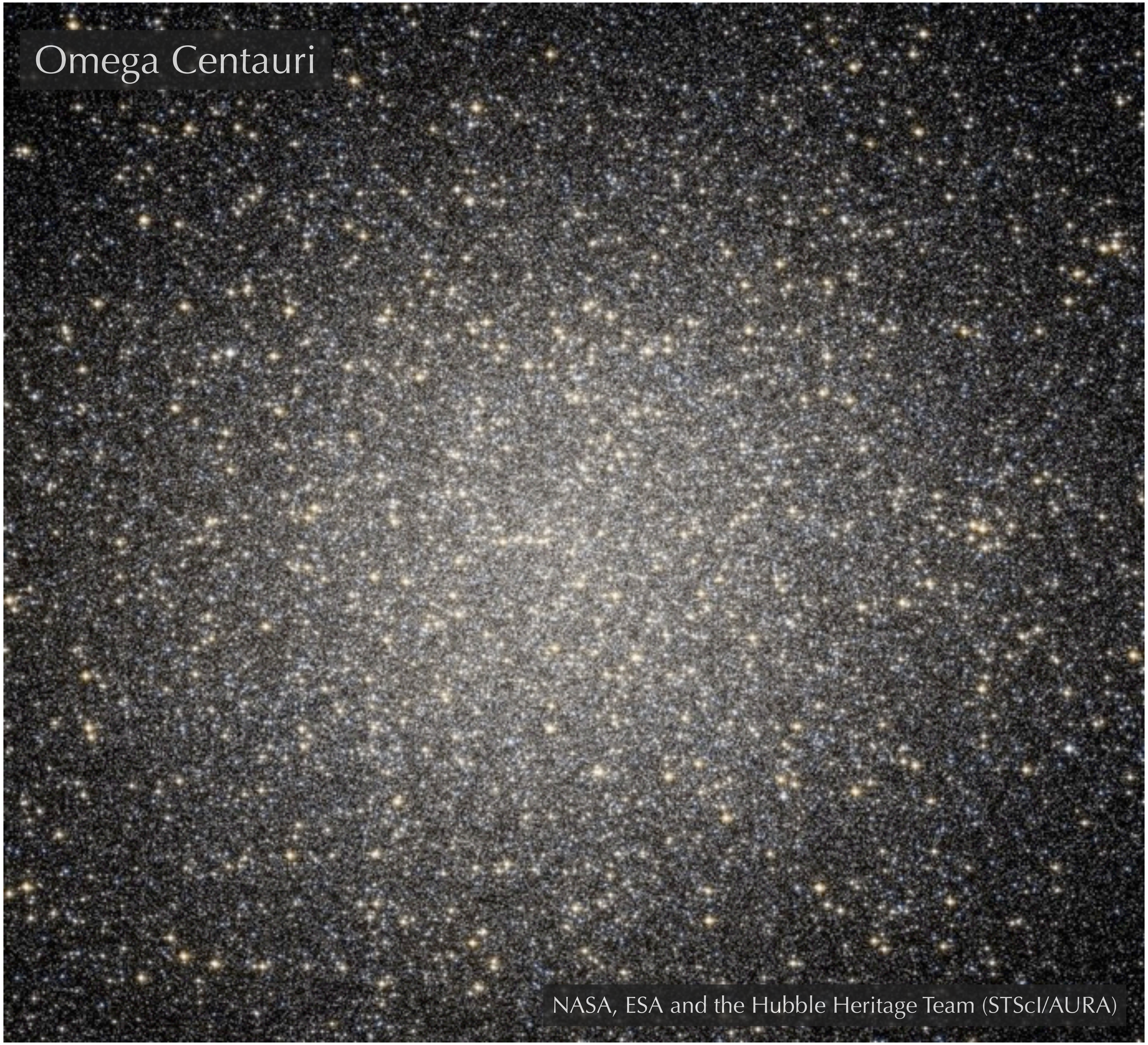

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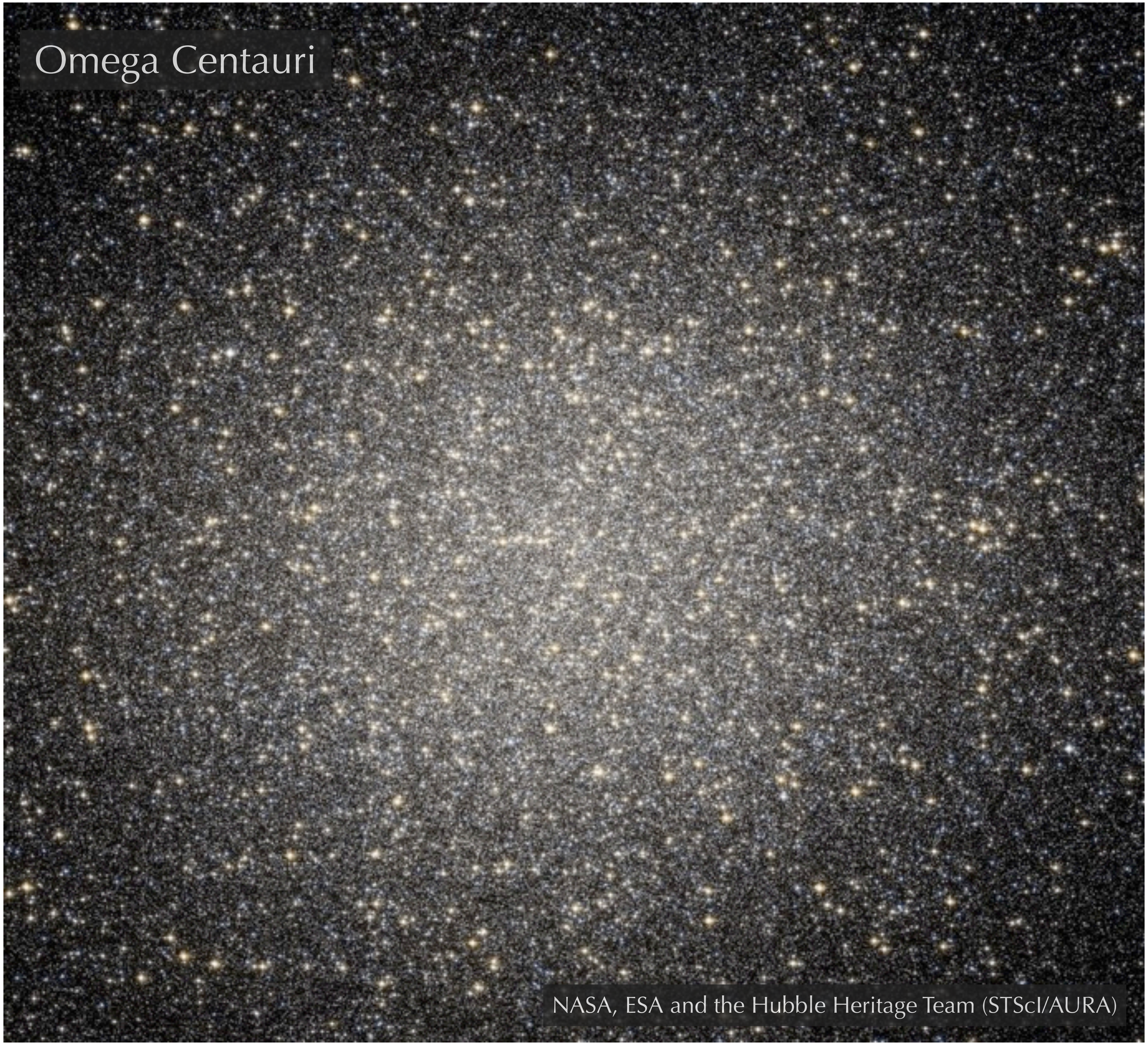

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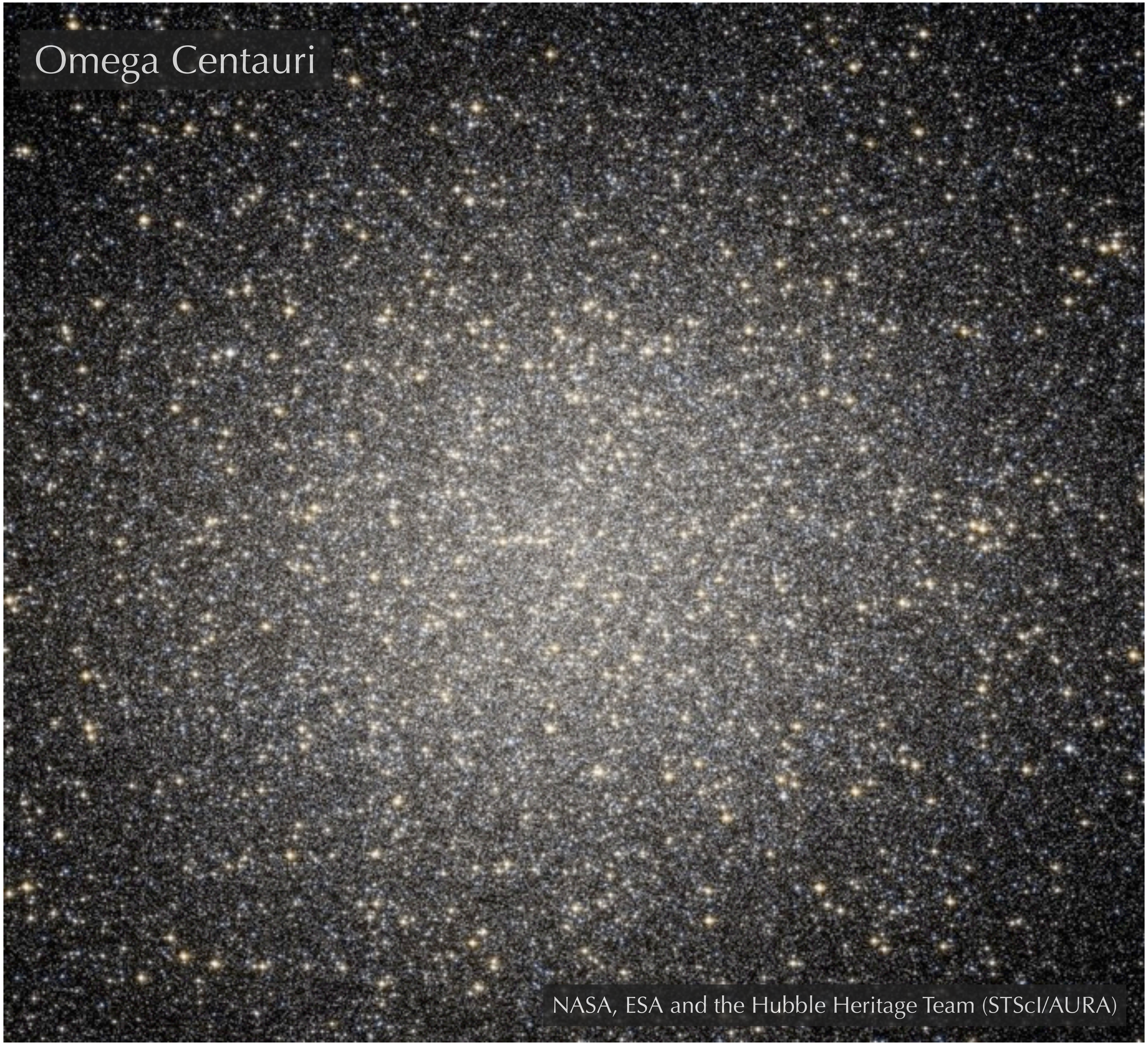

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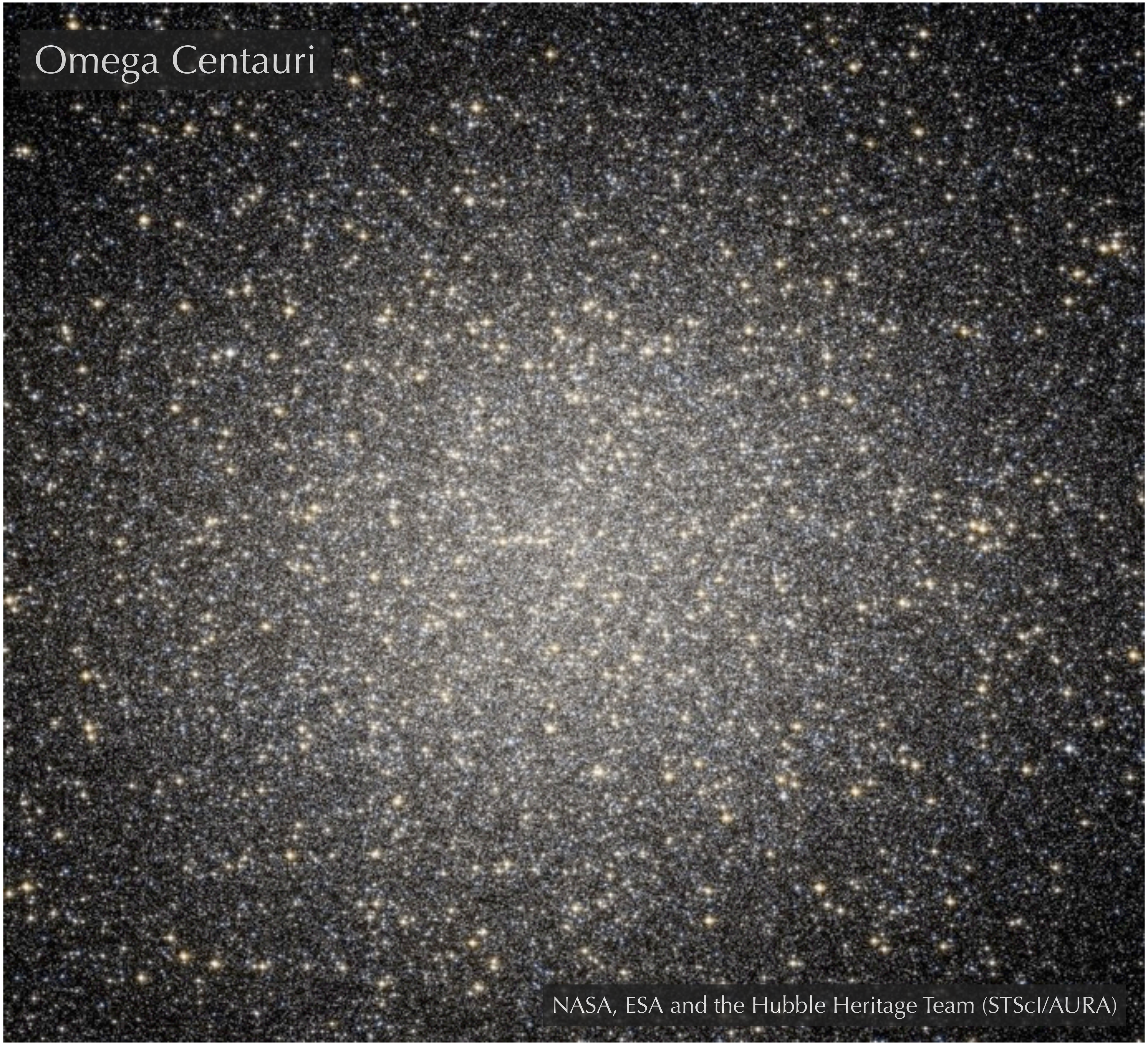

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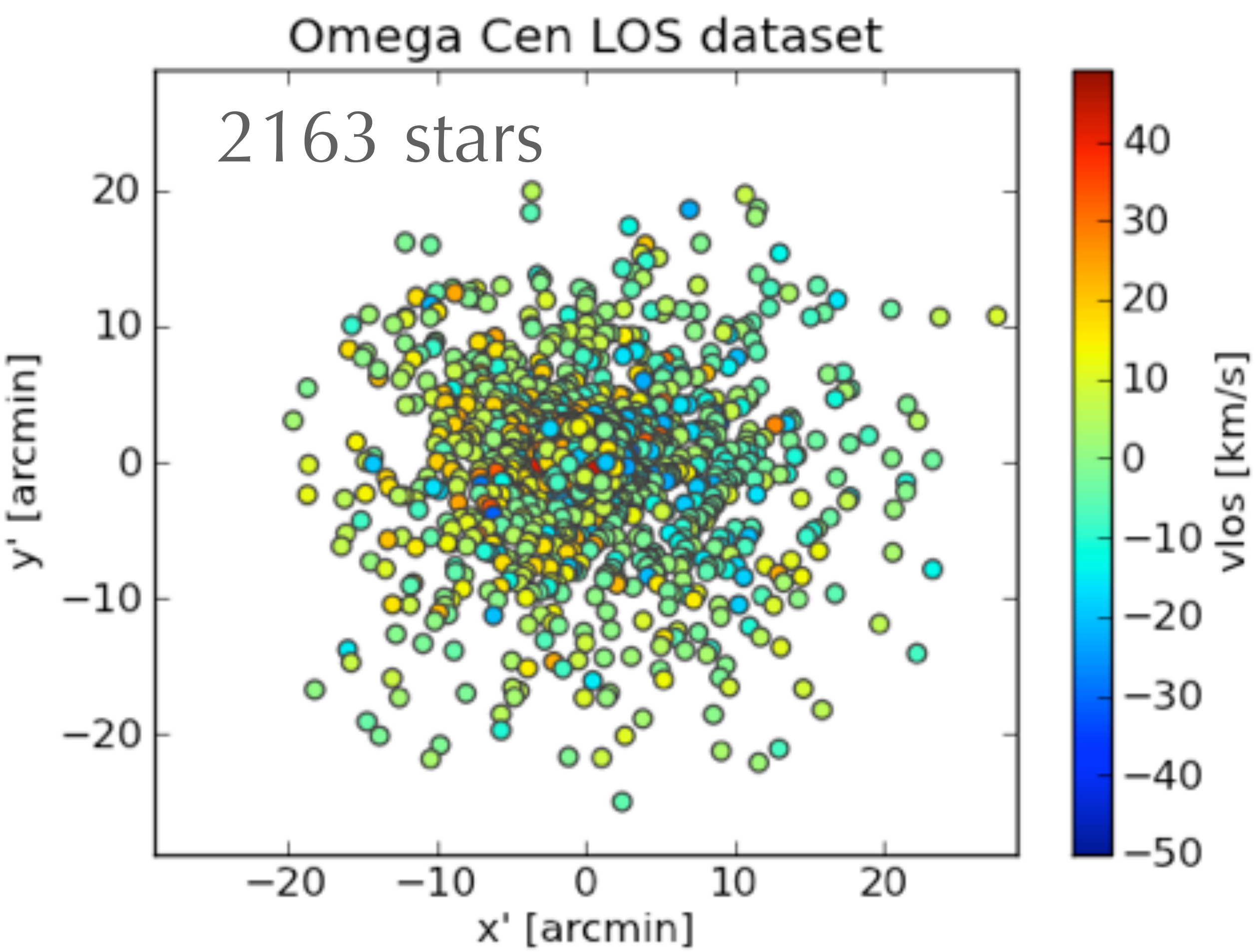
- IMBH?
- lots of good data

some Local Group objects have fantastic data sets



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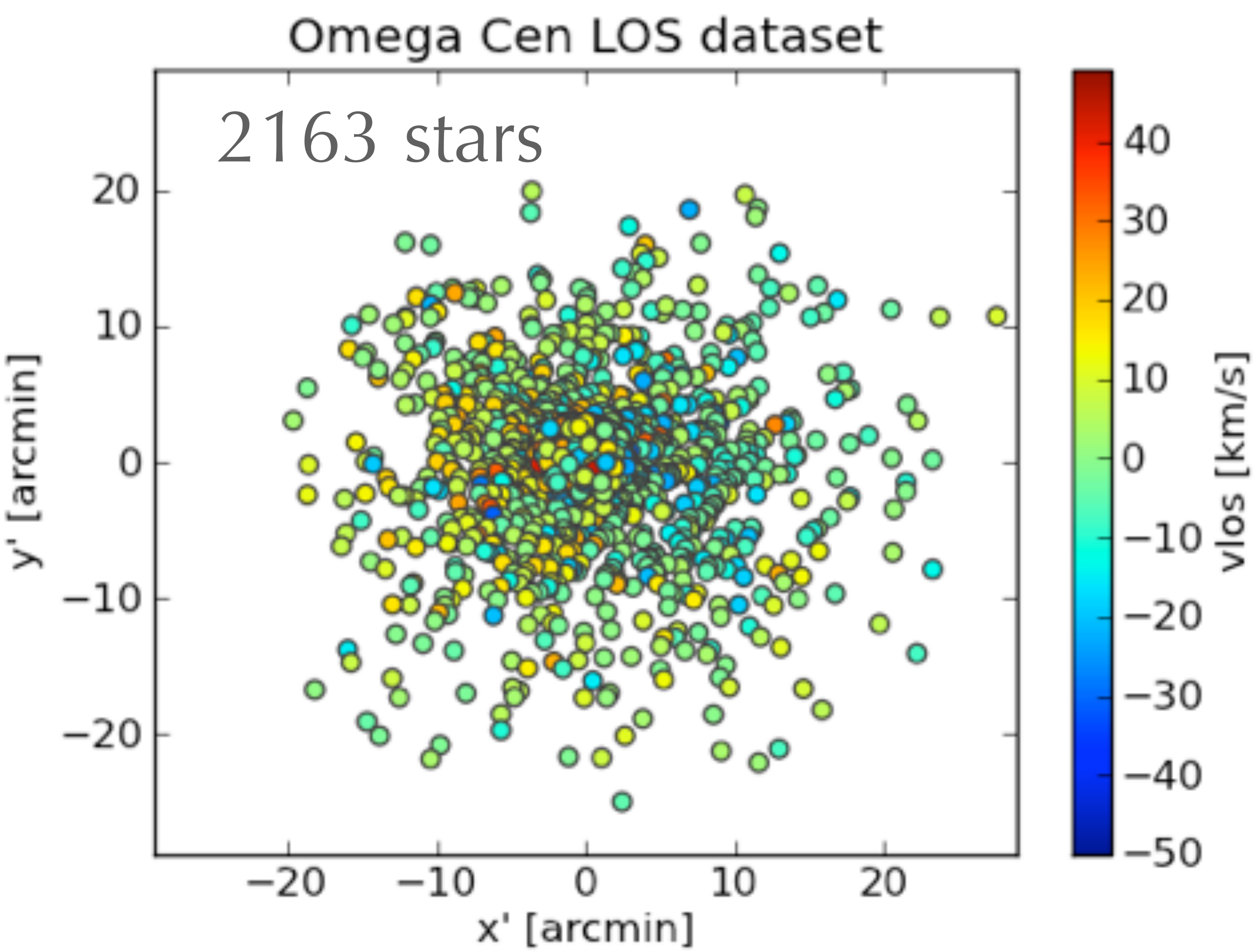
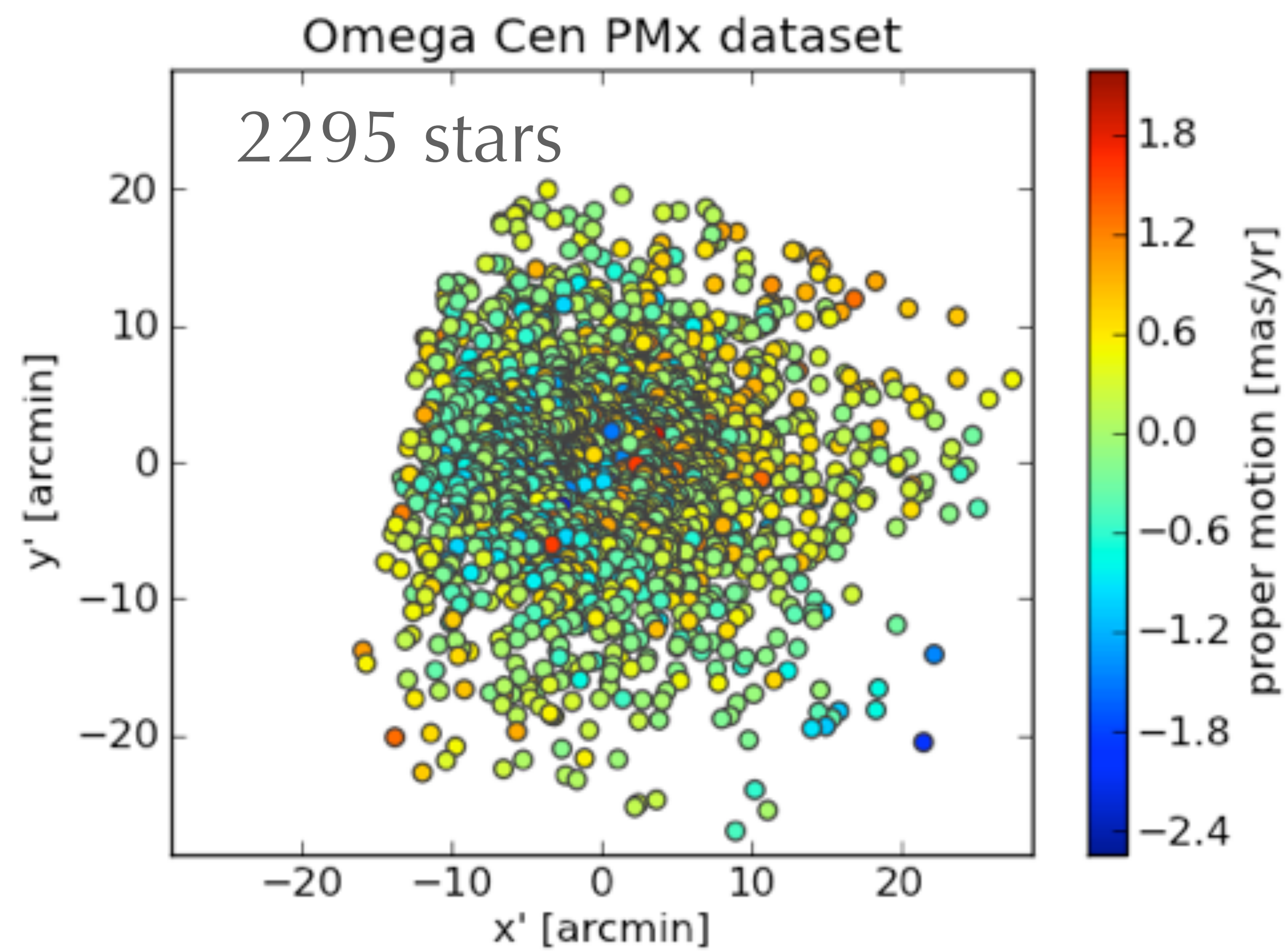
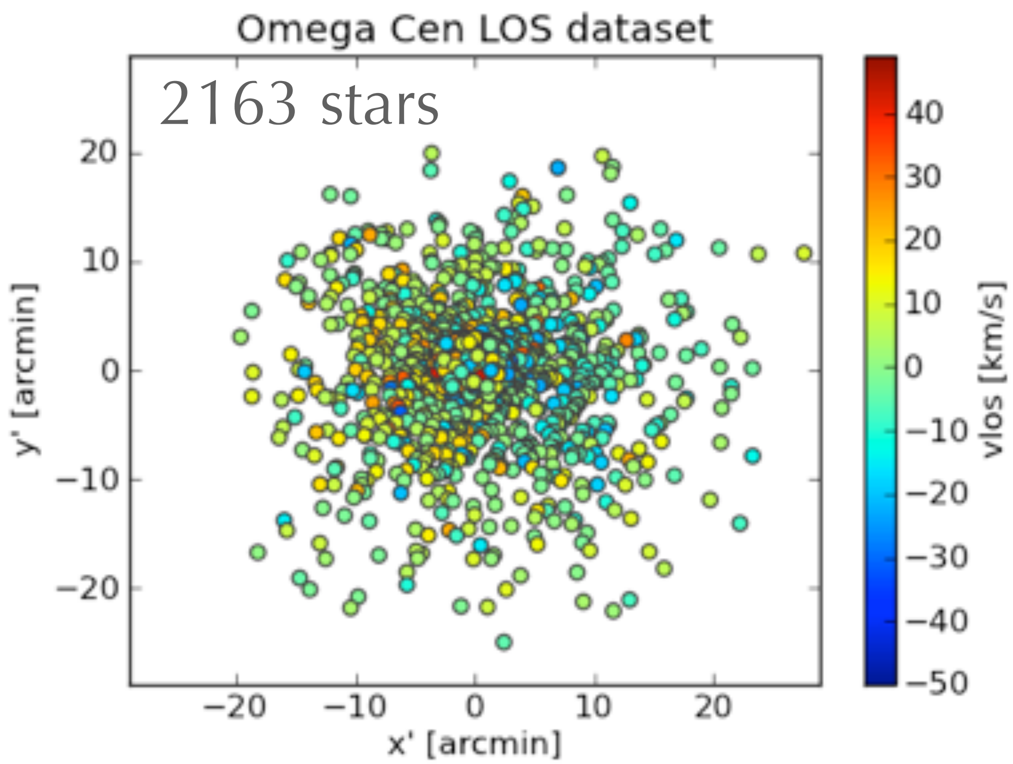
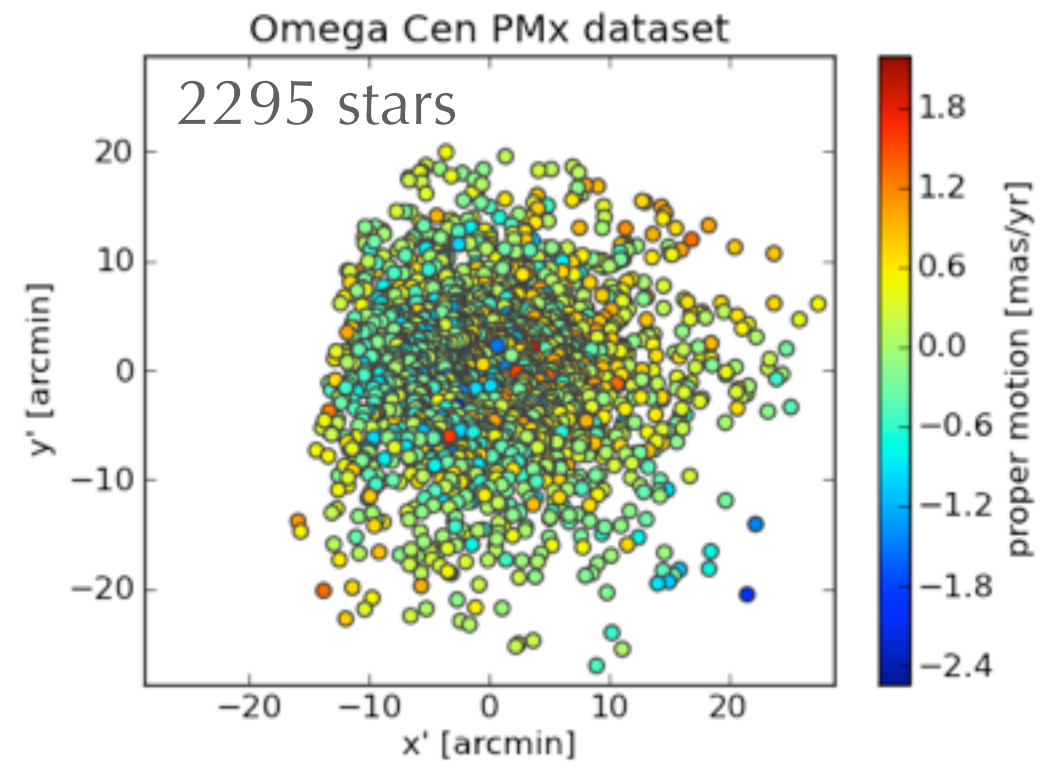
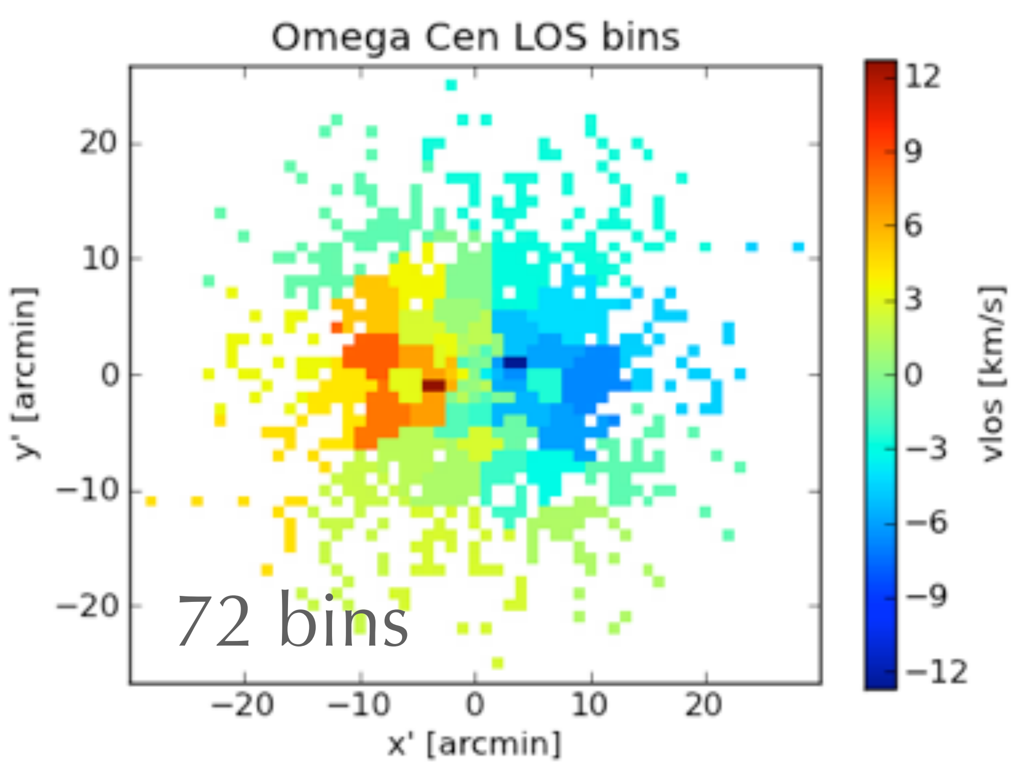




we bin spatially







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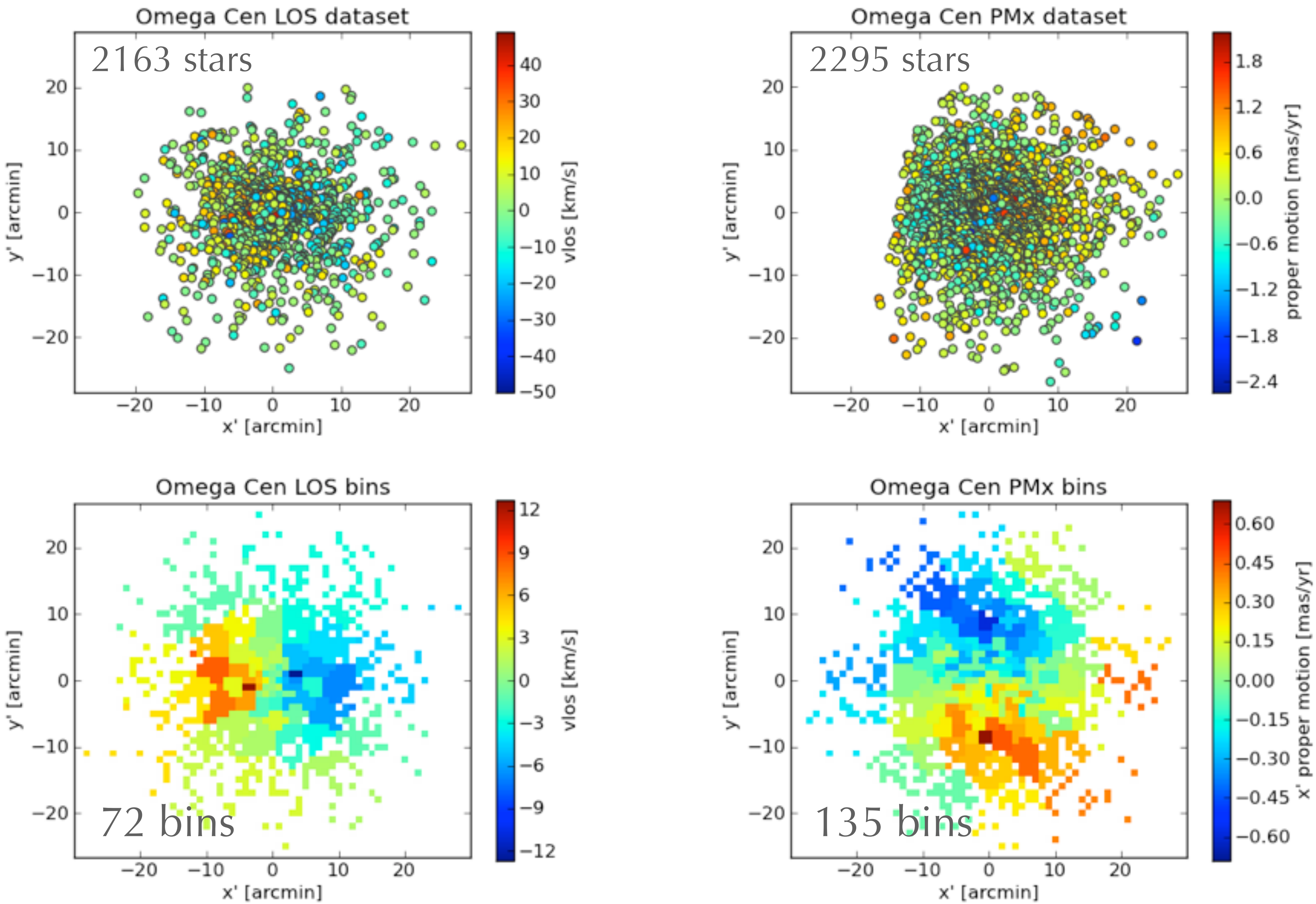
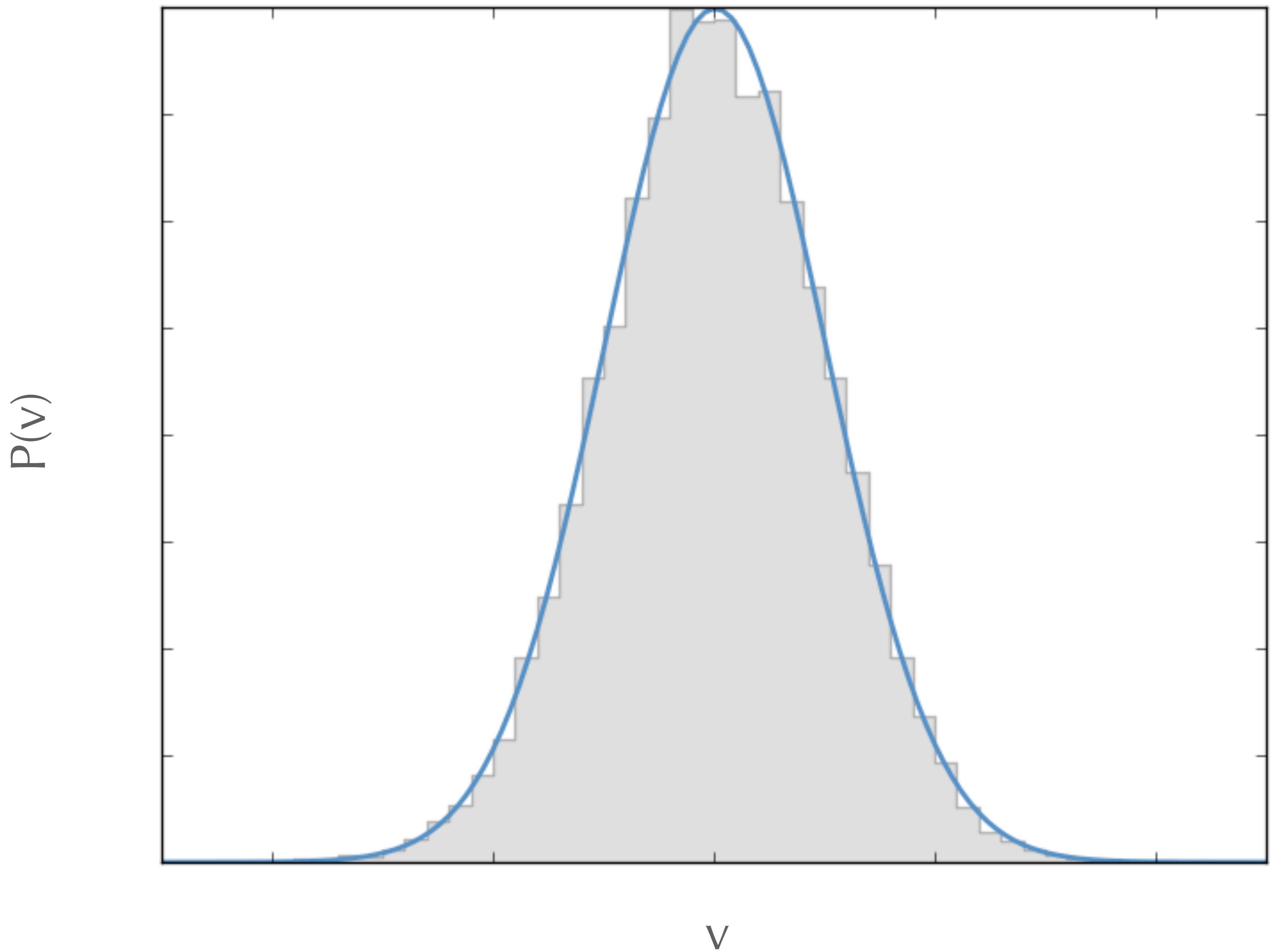


binning matches moments



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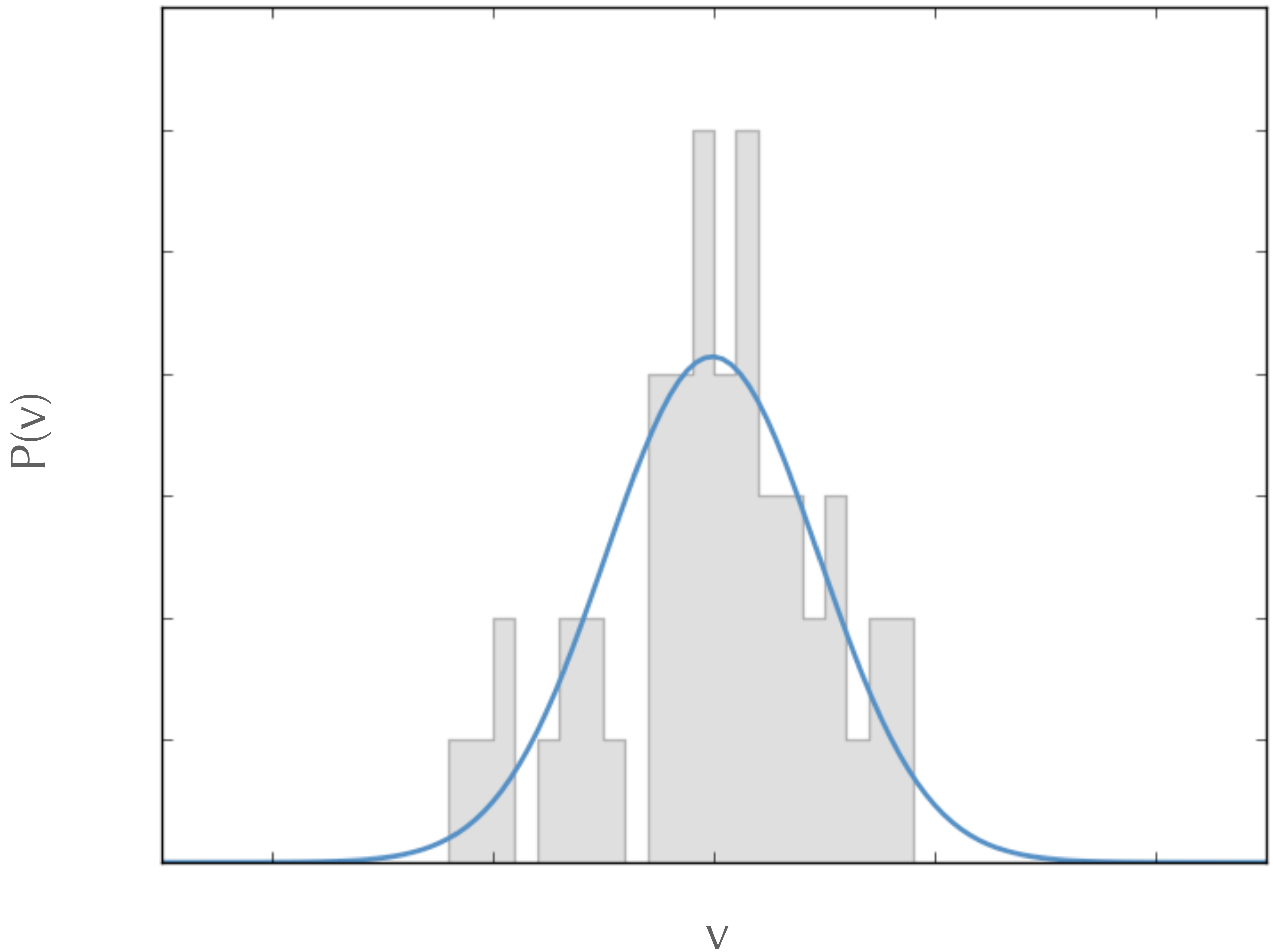

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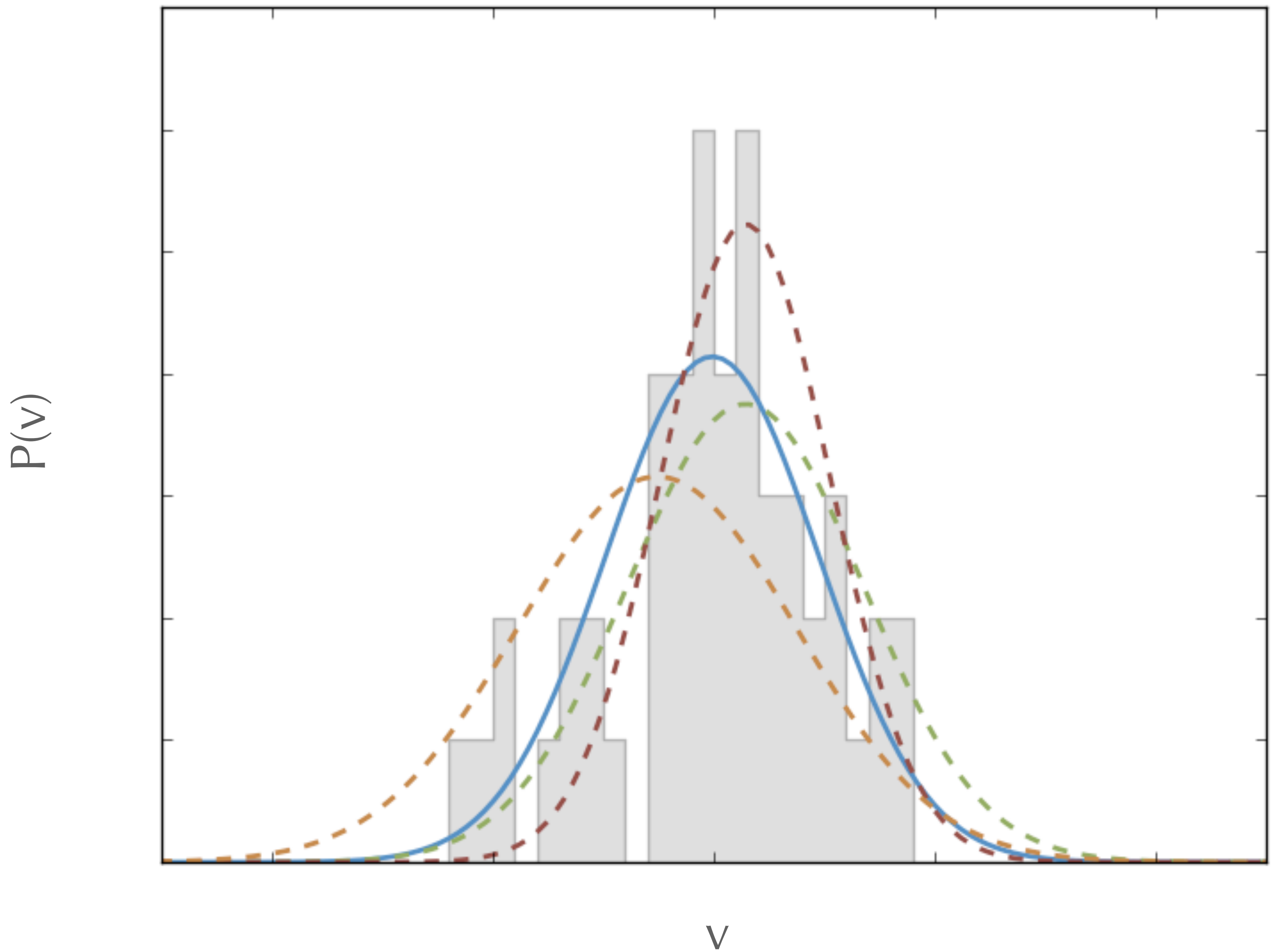
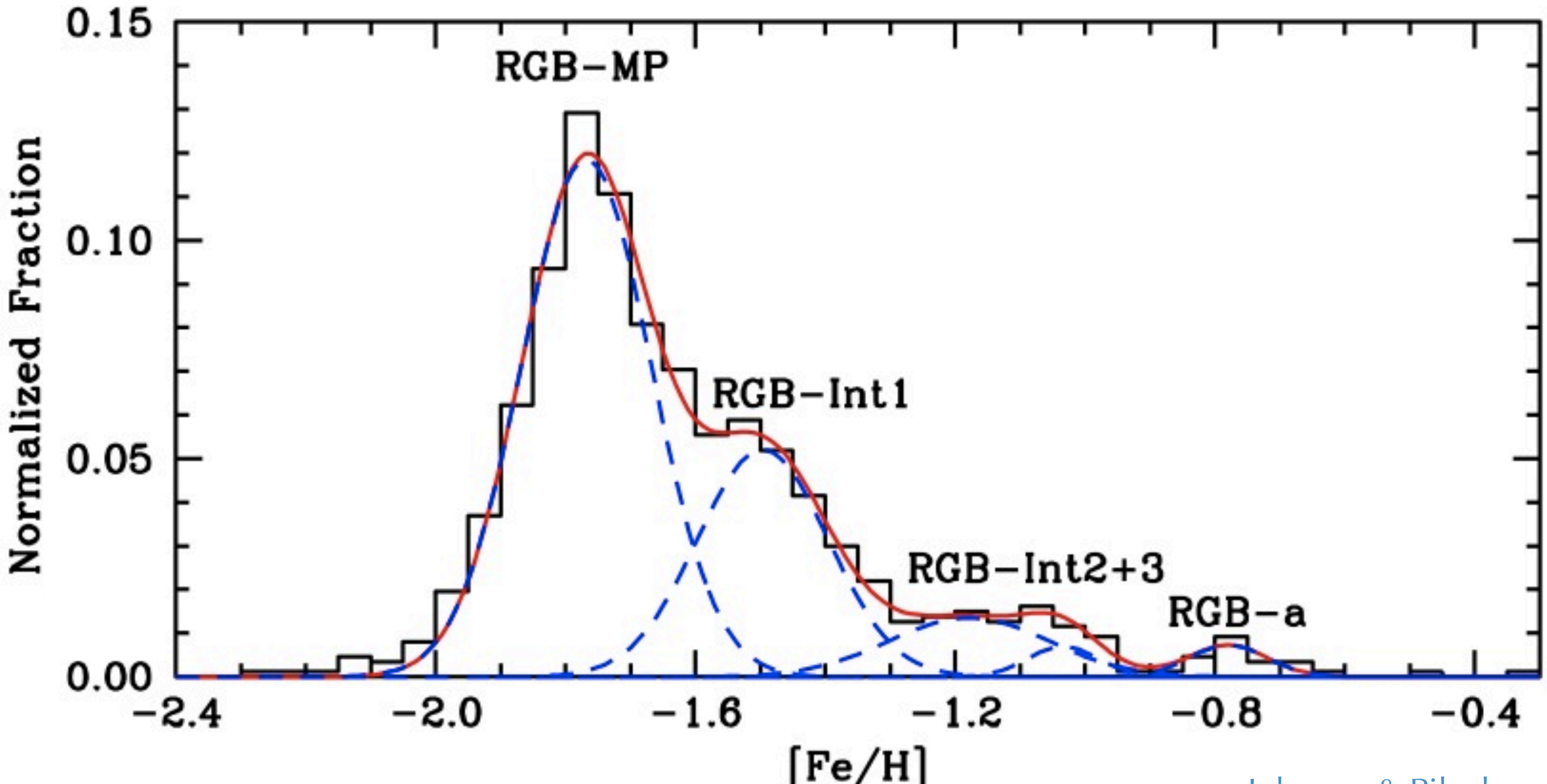
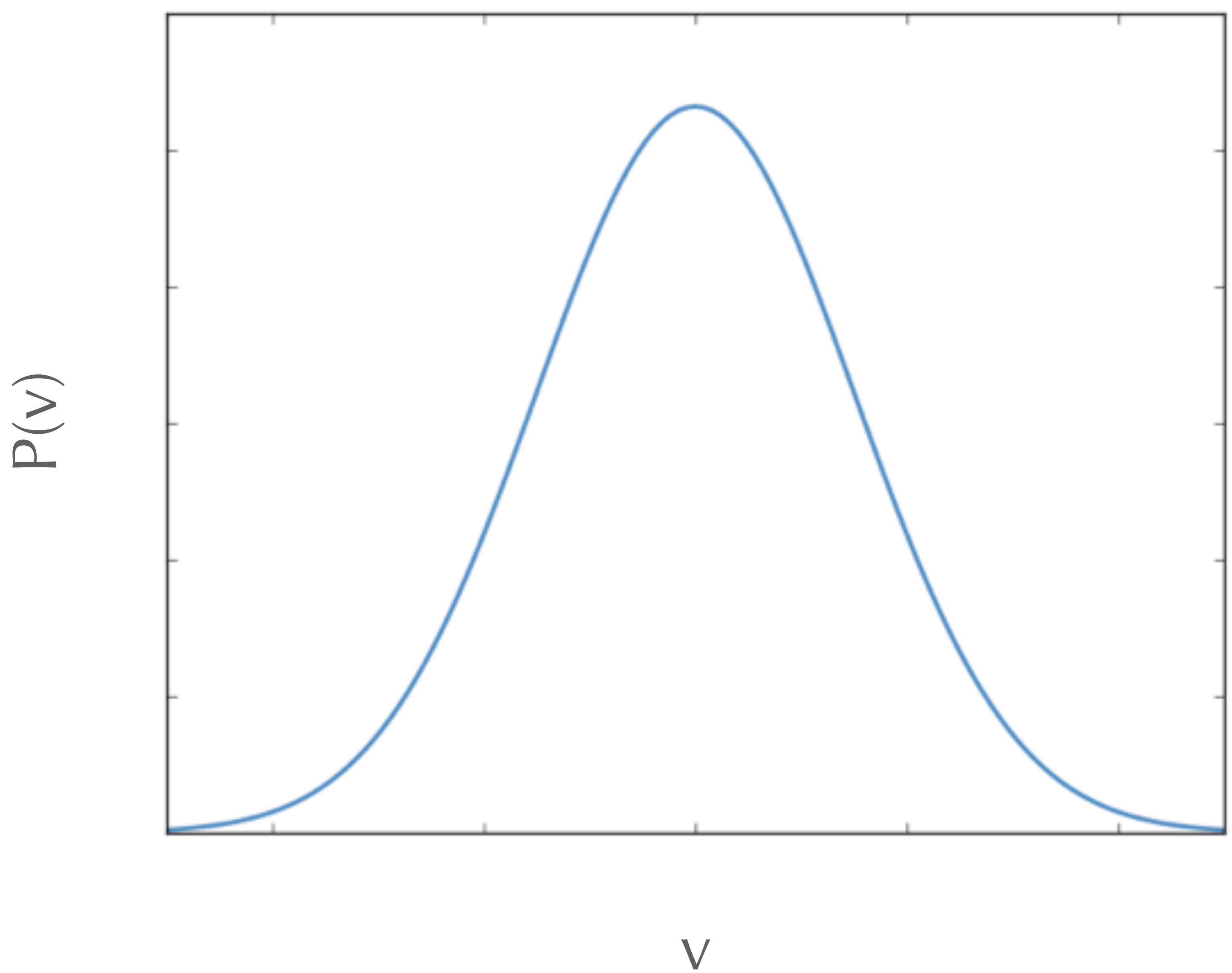


we can incorporate chemical information

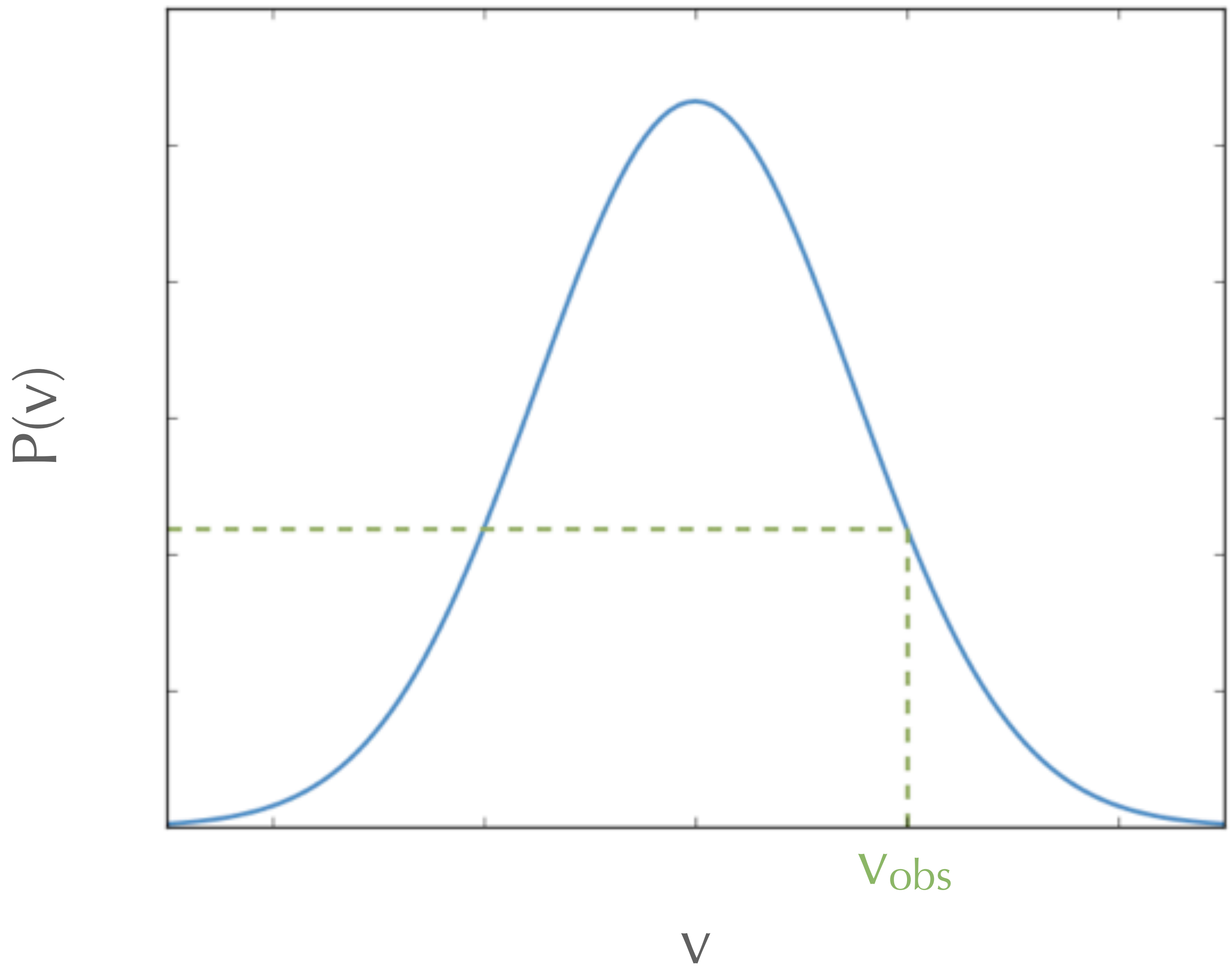
Omega Cen metallicity distribution



Johnson & Pilachowski 2010


P(v)
v

we don't want to bin at all



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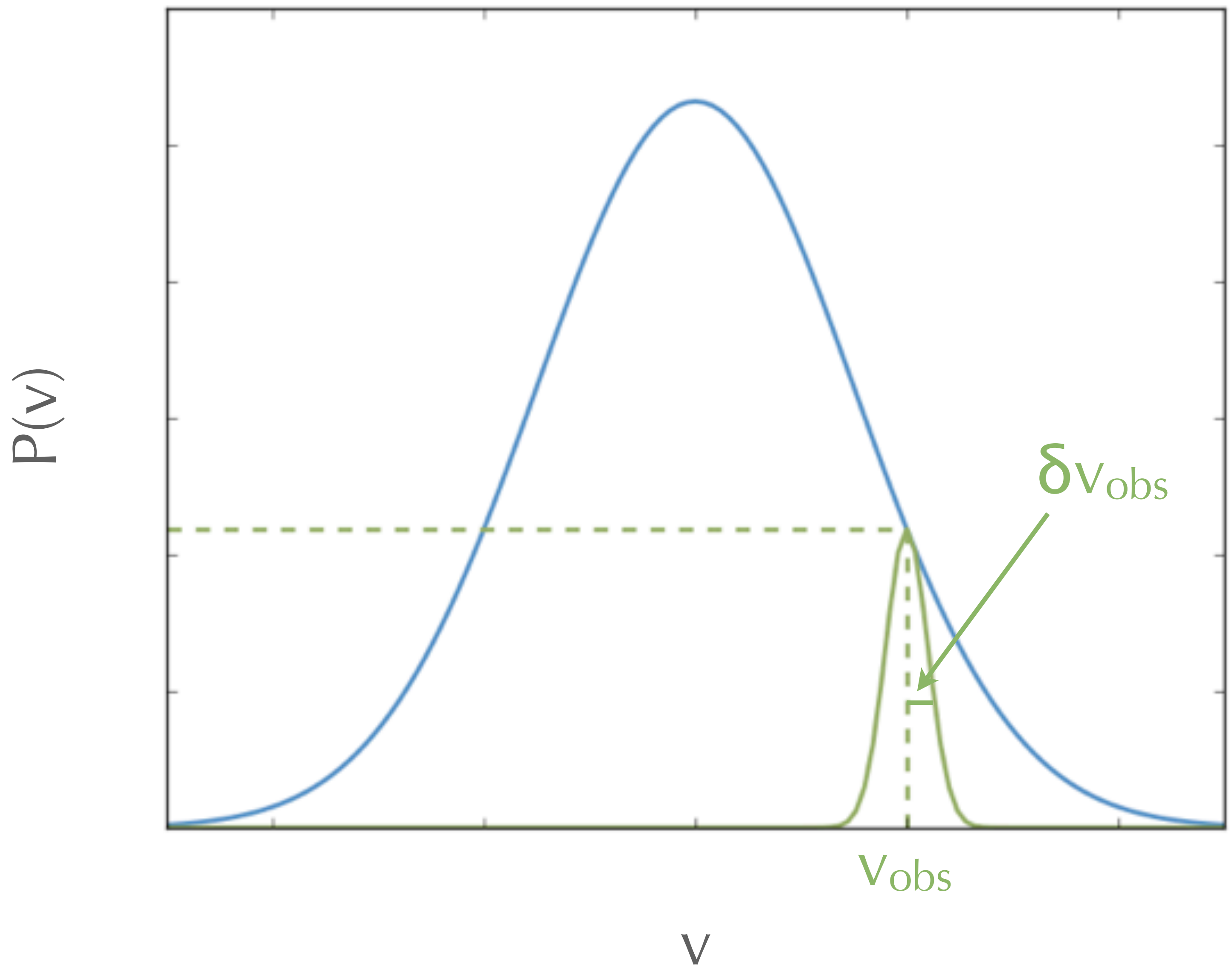
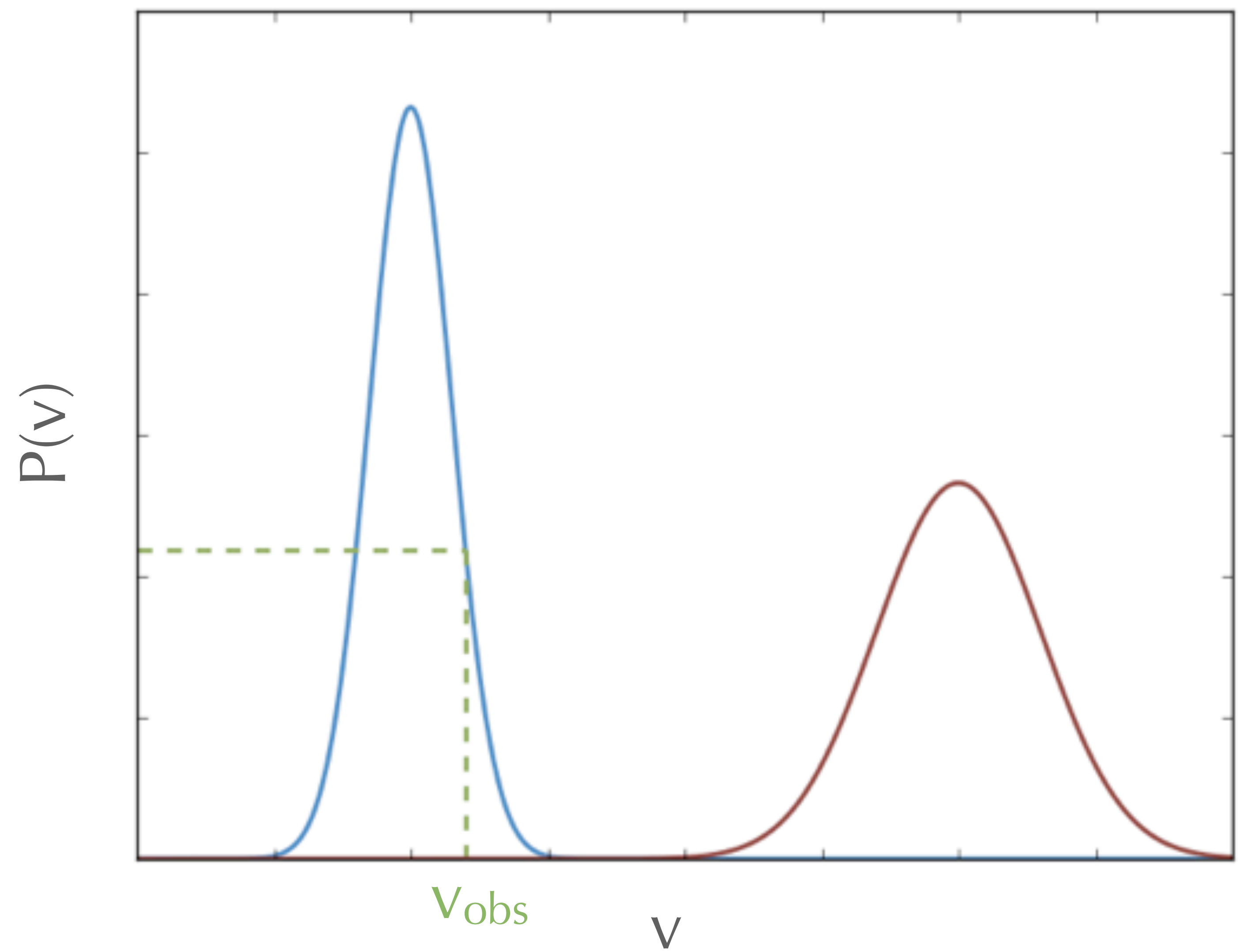


$\mathcal{L}(v_{obs} \mid \text{model}, \delta v_{obs})$

we can improve membership probabilities



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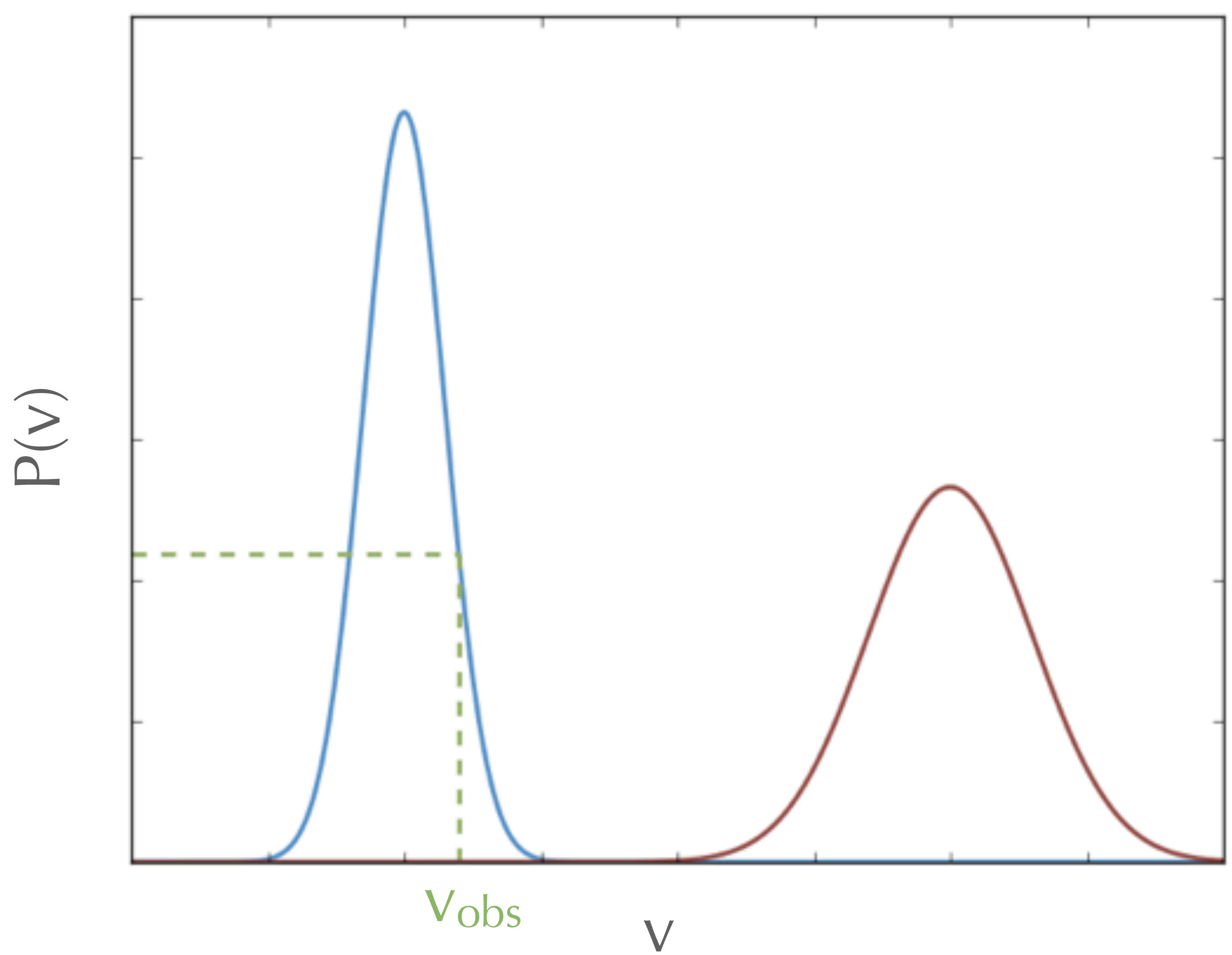

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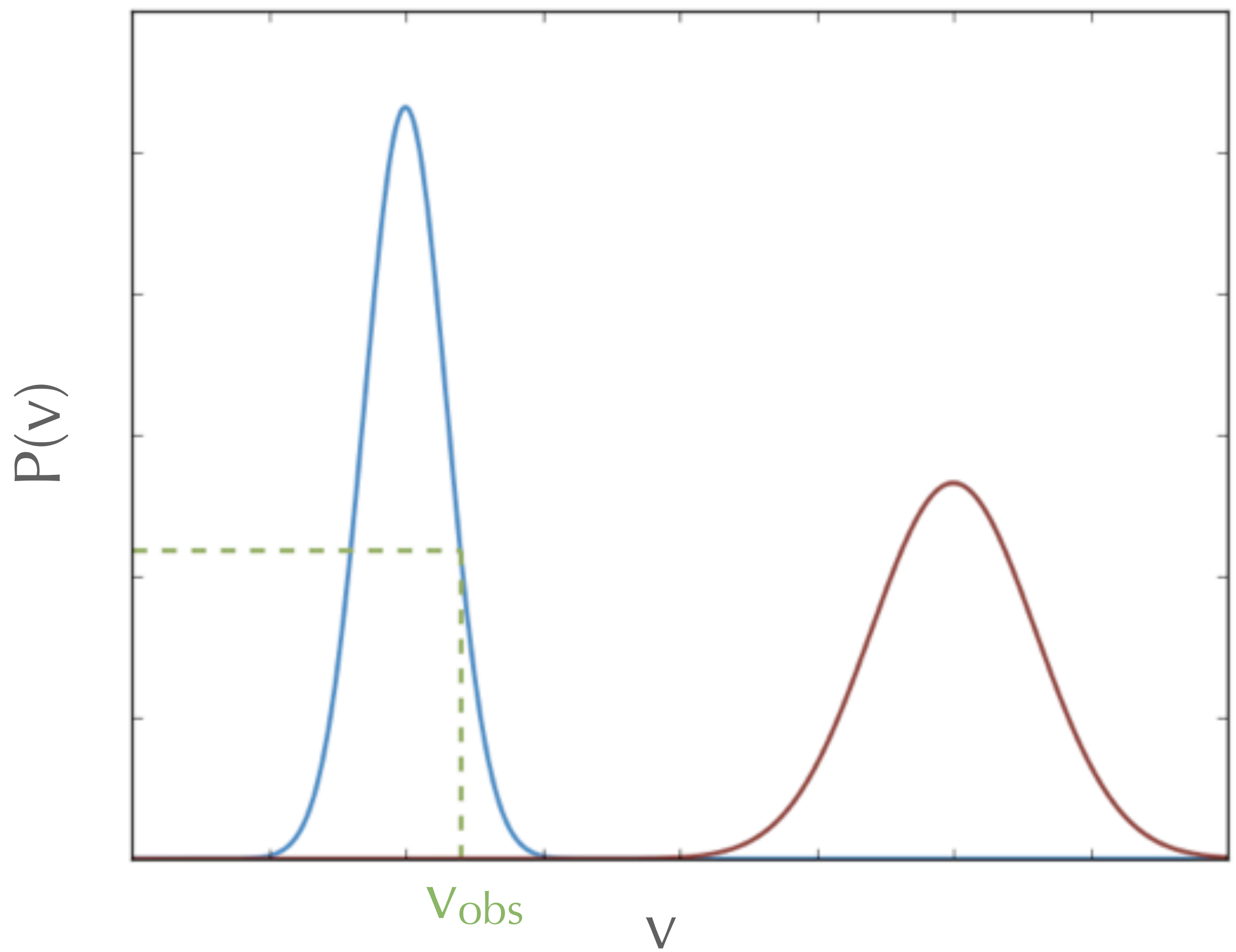
$$\mathcal{L}(\ v_{obs}\ |\ \text{model}\ )^{p} \times \mathcal{L}(\ v_{obs}\ |\ \text{background}\ )^{1-p}$$



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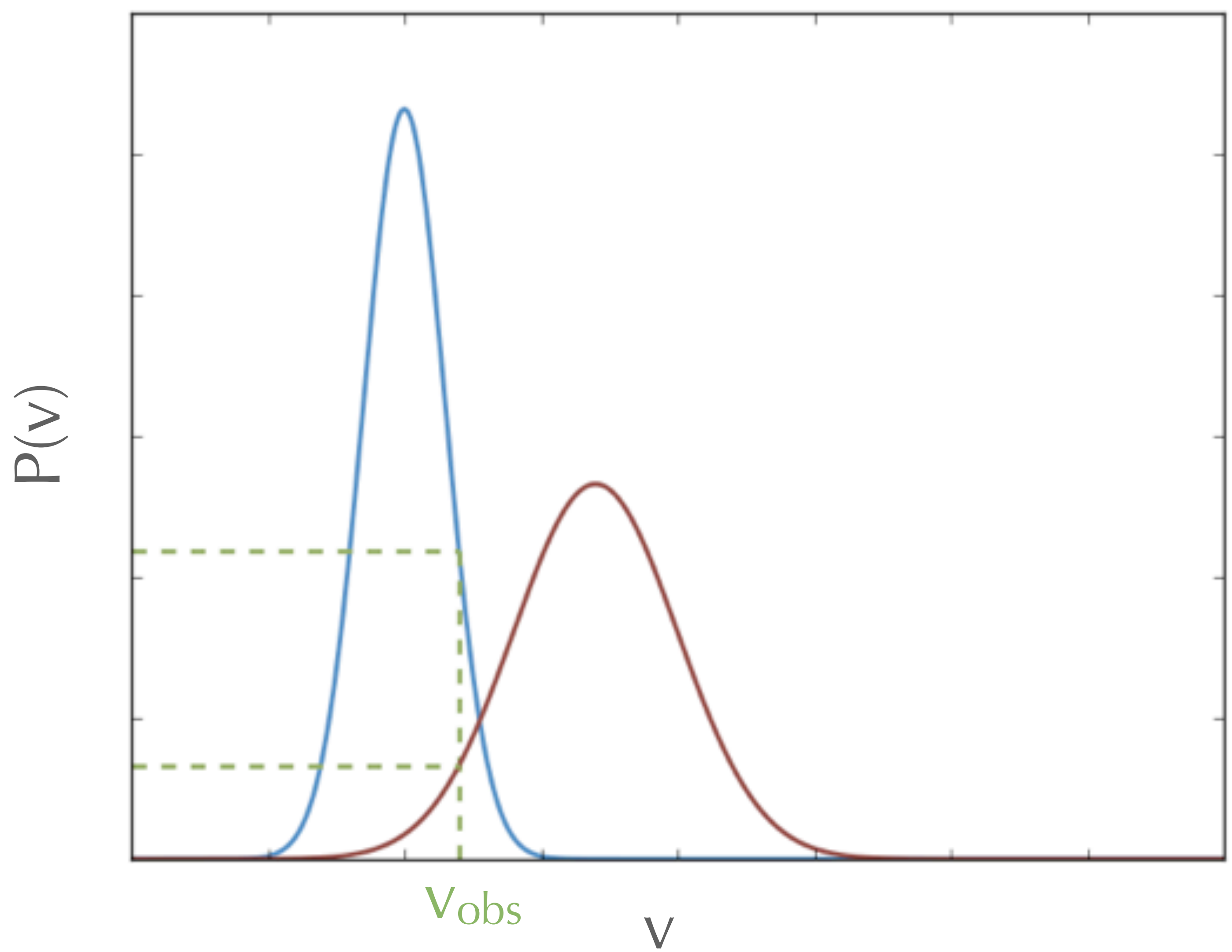

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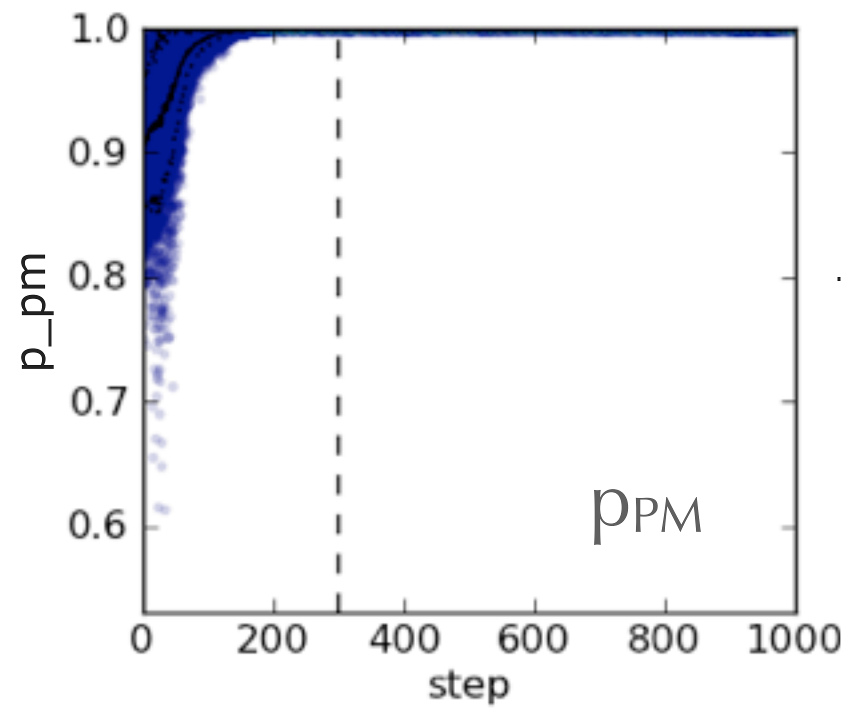
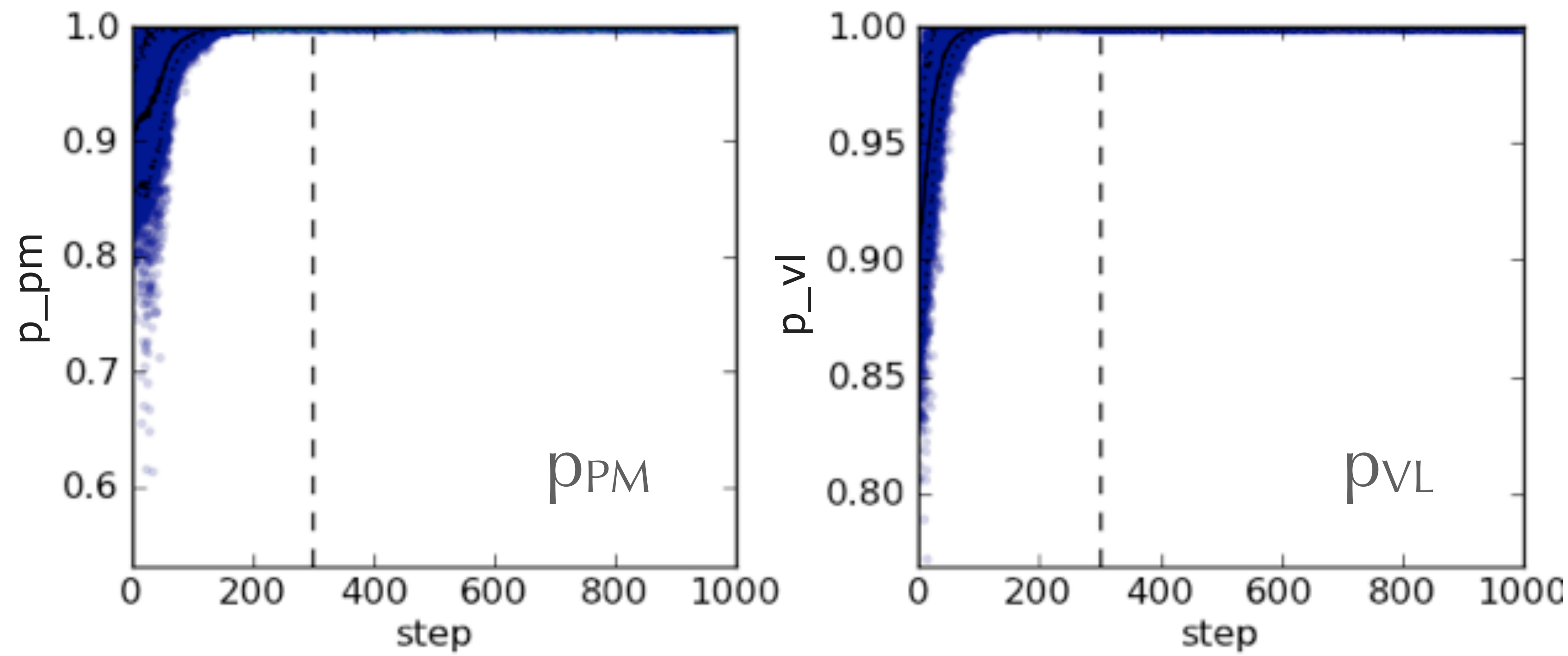
+

emcee MCMC Foreman-Mackey et al. 2012


1.0
0.9
0.8
0.7
0.6
p_pm
0
200
400
600
800
1000
step
pPM

preliminary results



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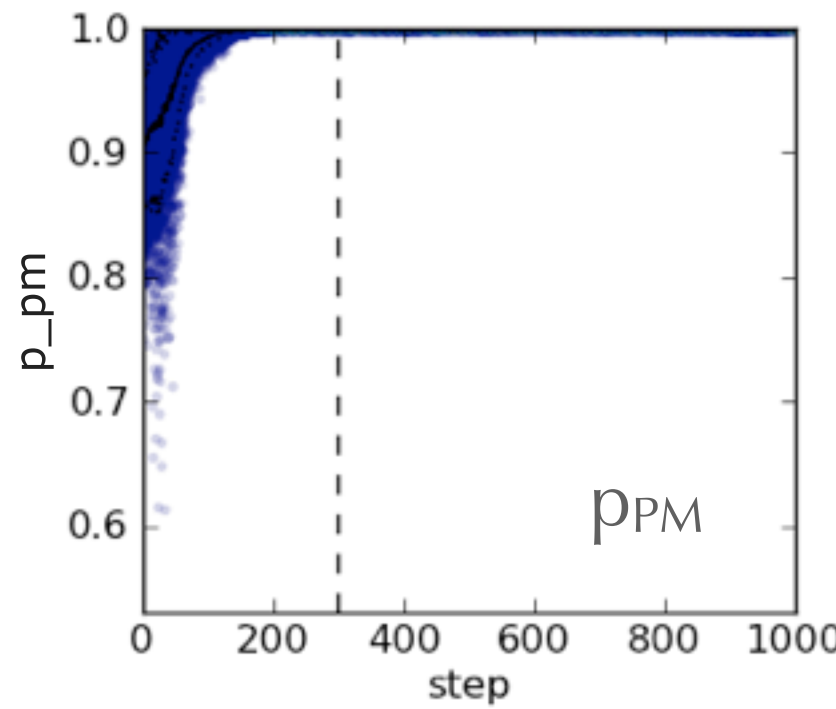

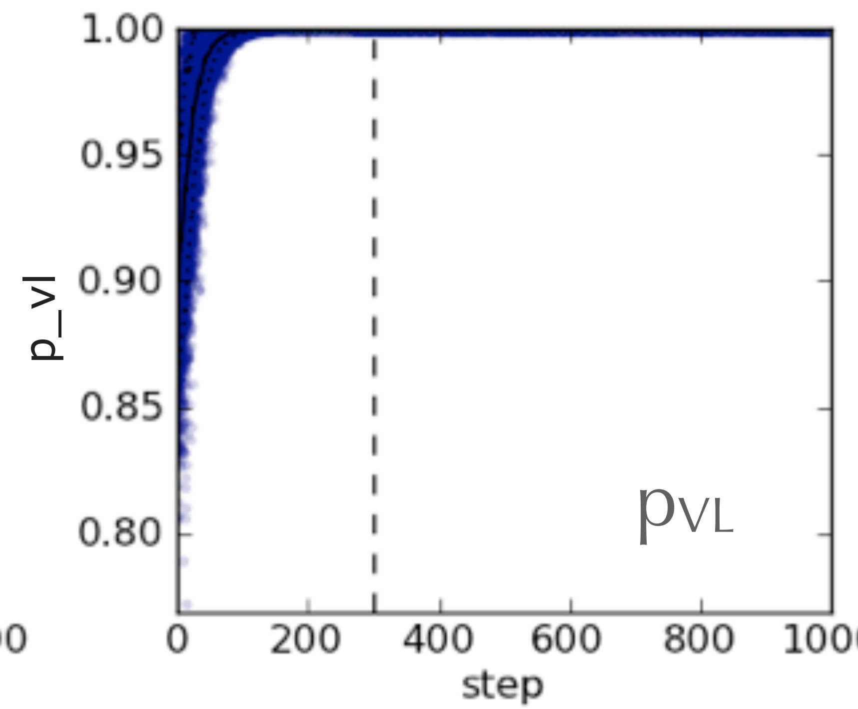

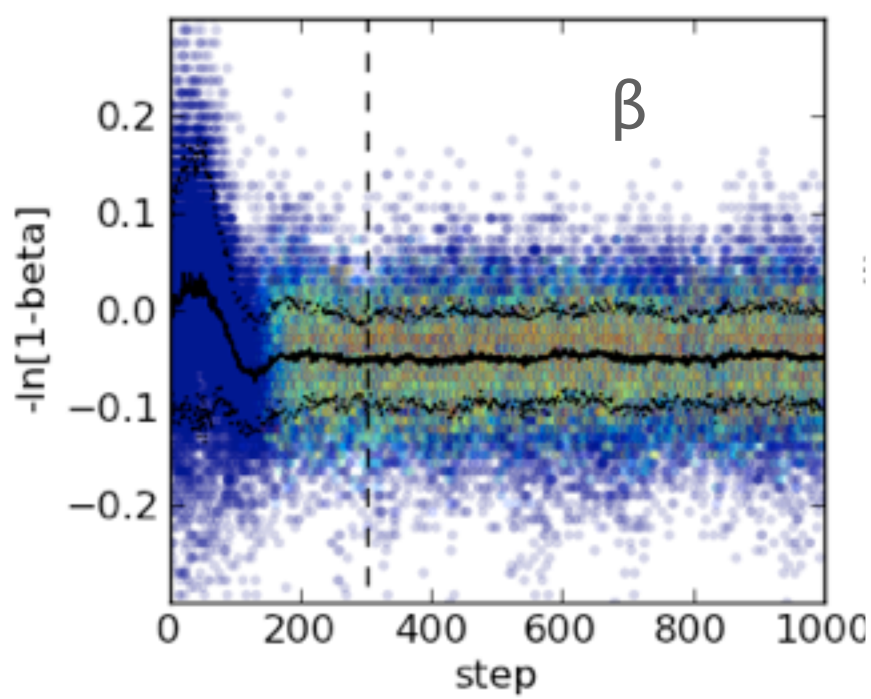

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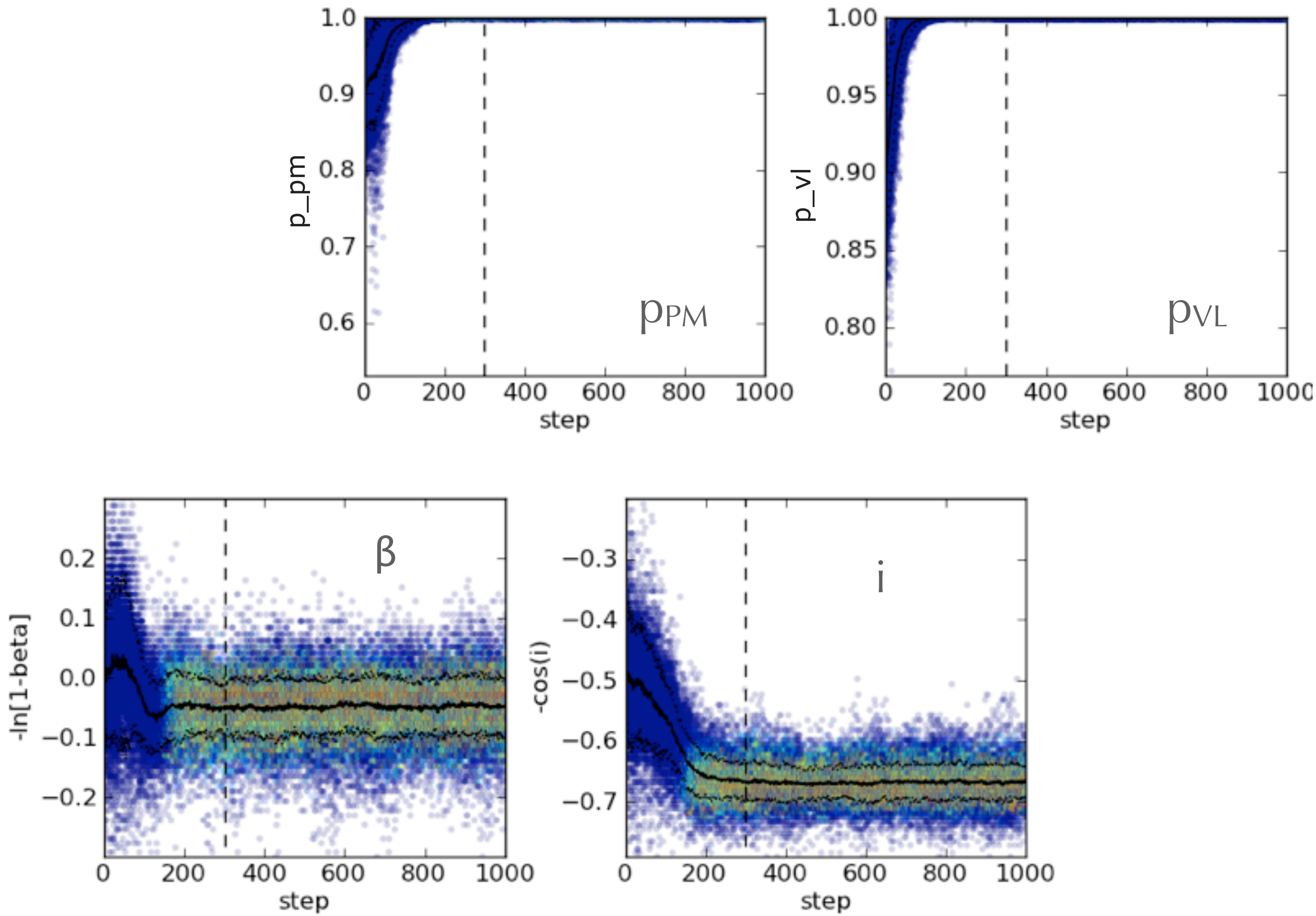

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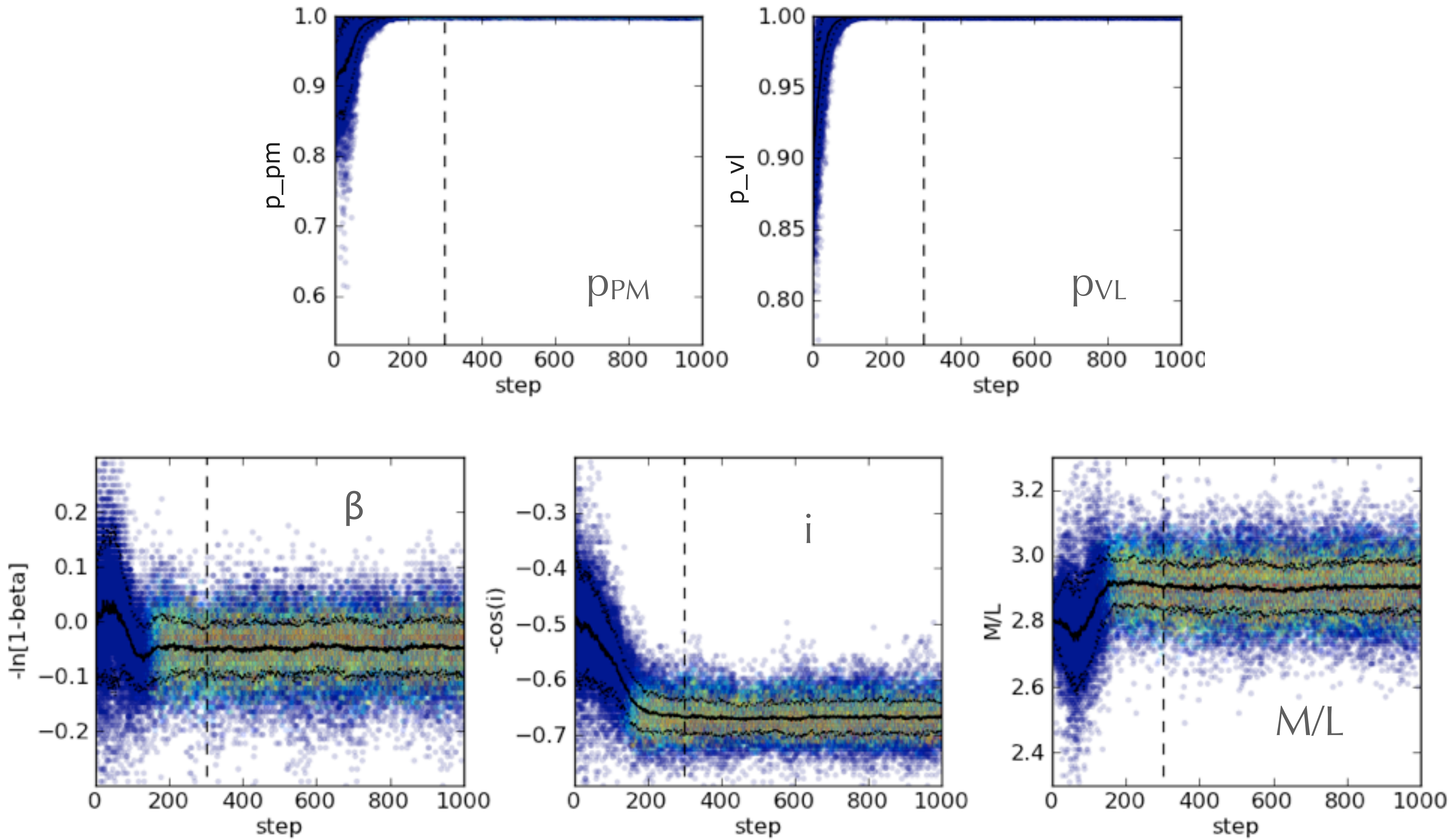
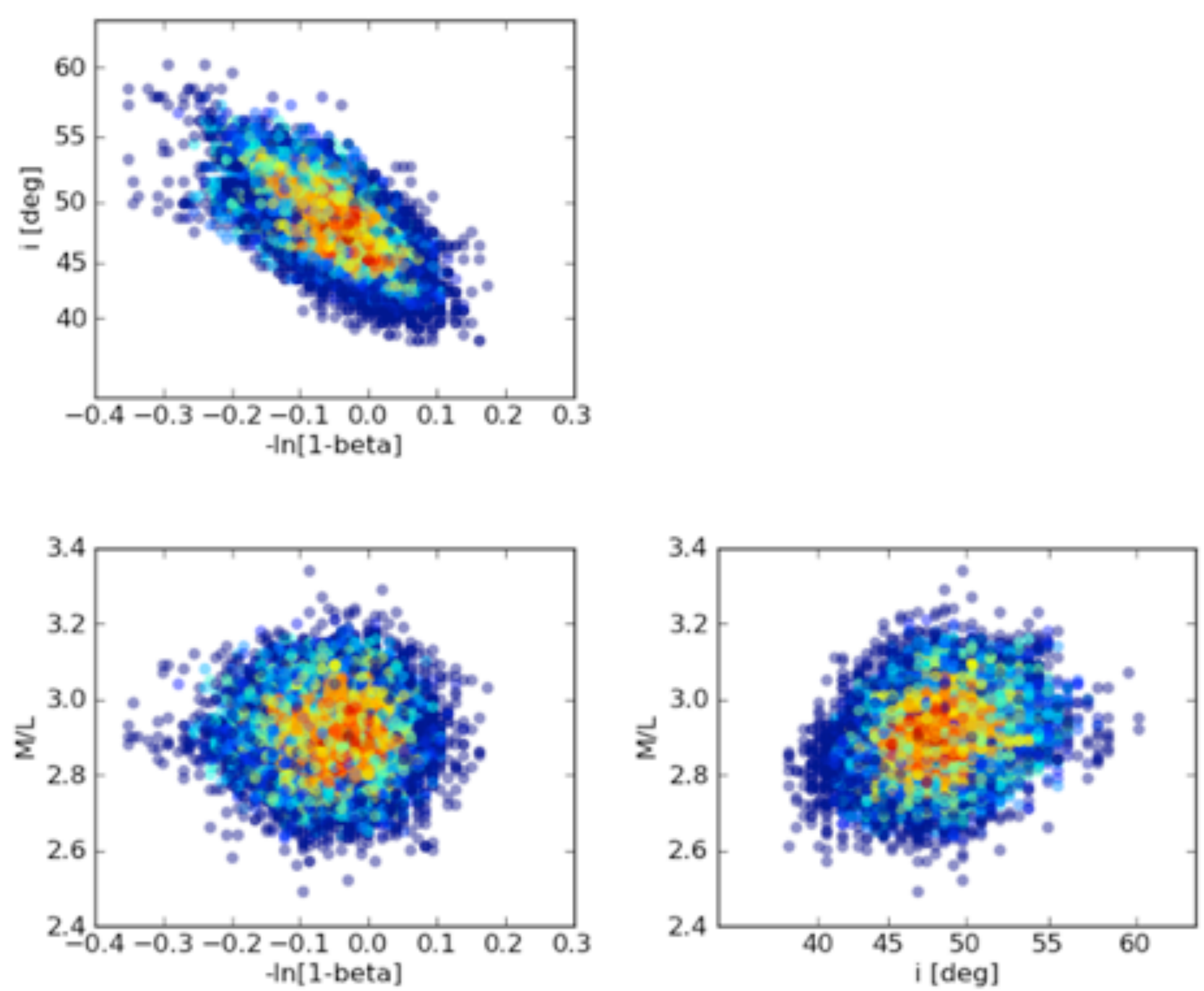


preliminary results

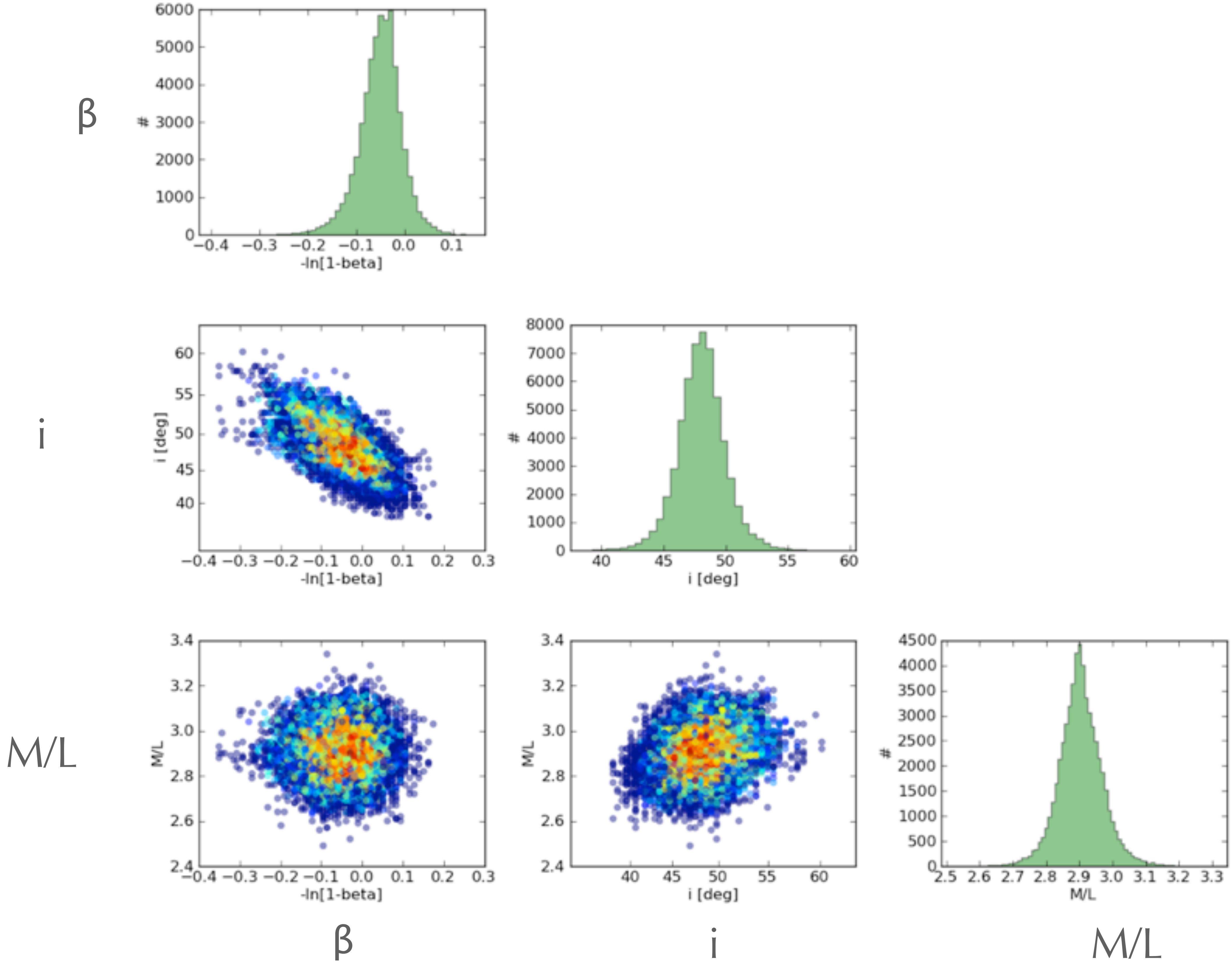
i

M/L



β i

preliminary results



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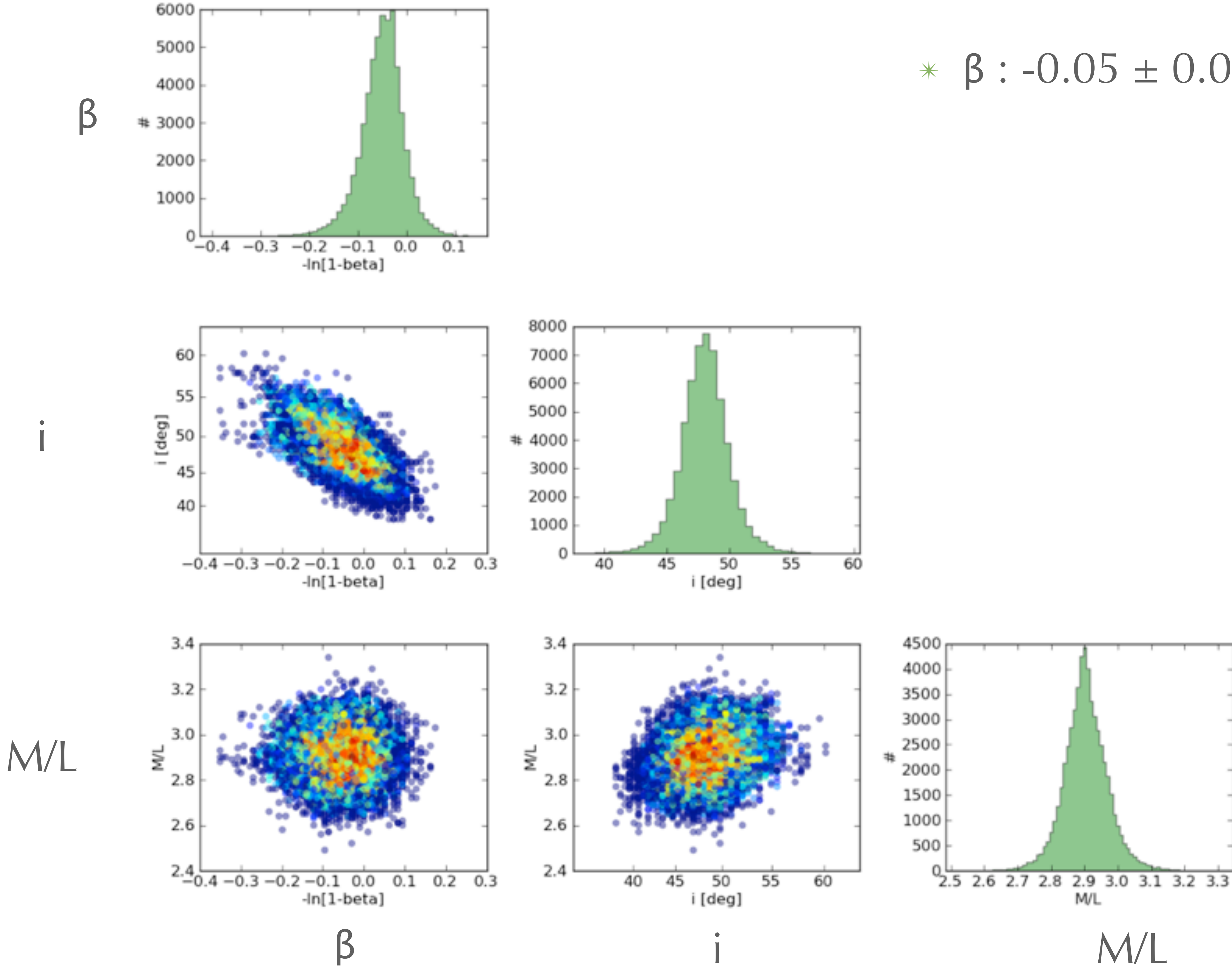

- β : -0.05 ± 0.05

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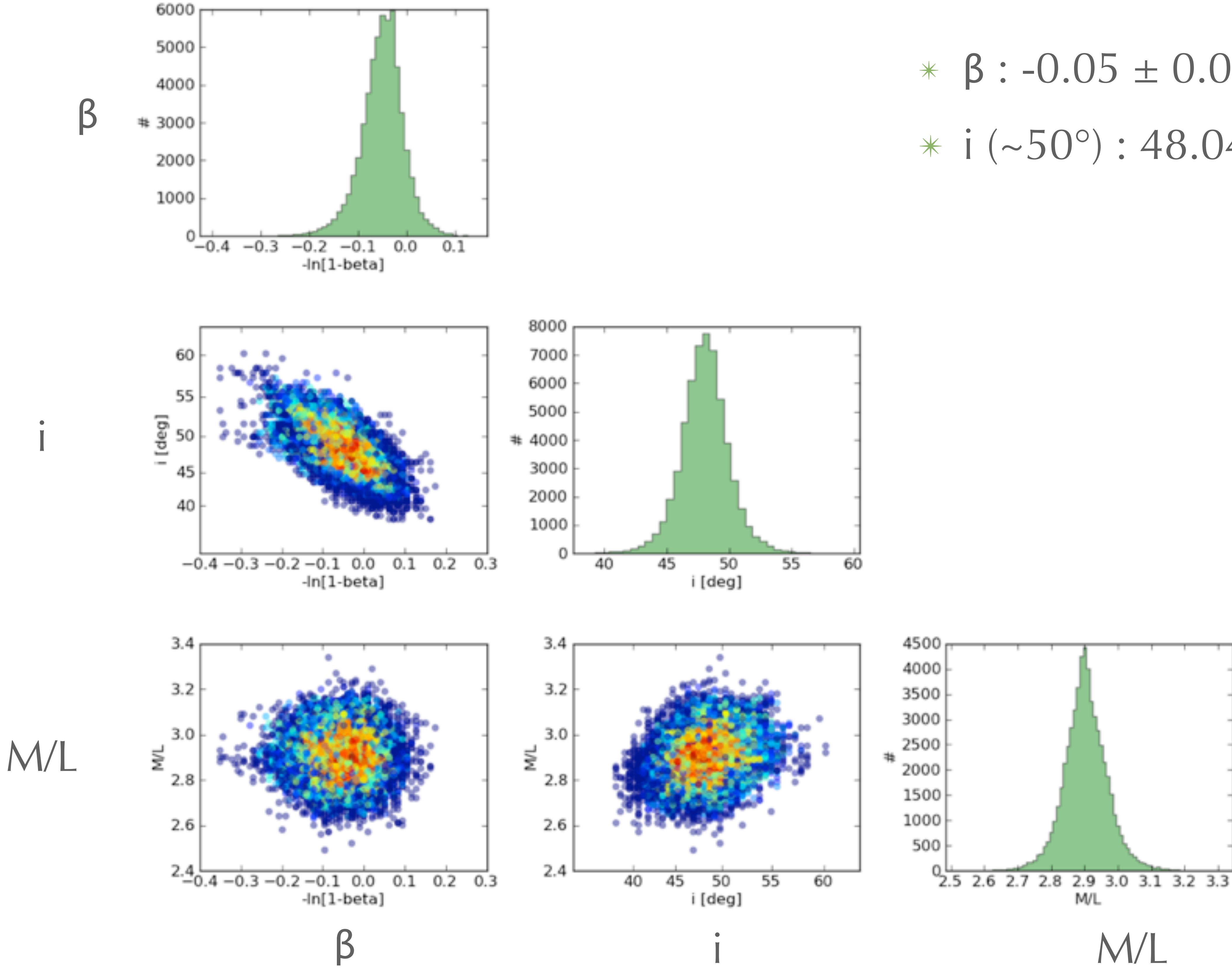

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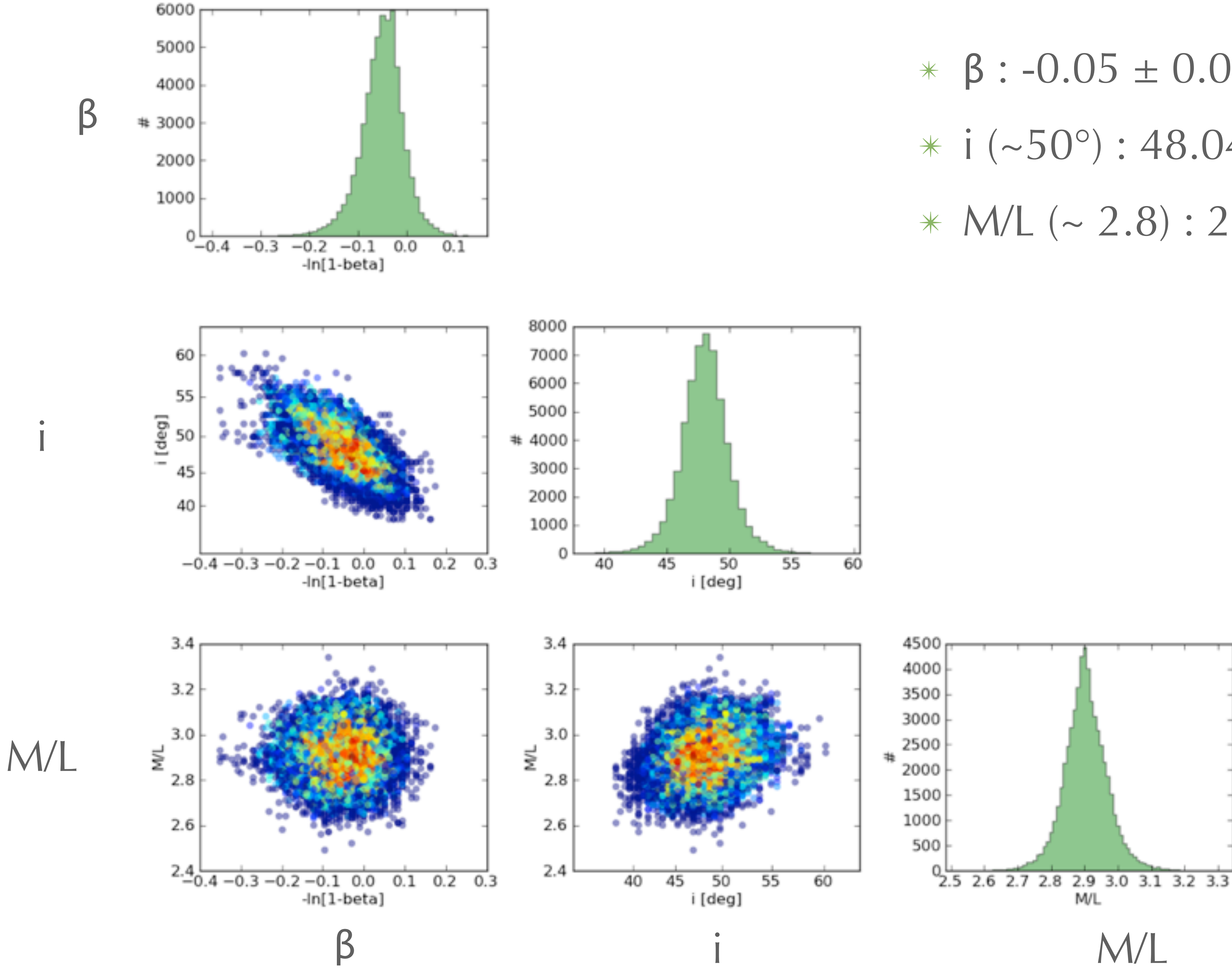

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- M/L (~ 2.8) : 2.90 ± 0.07

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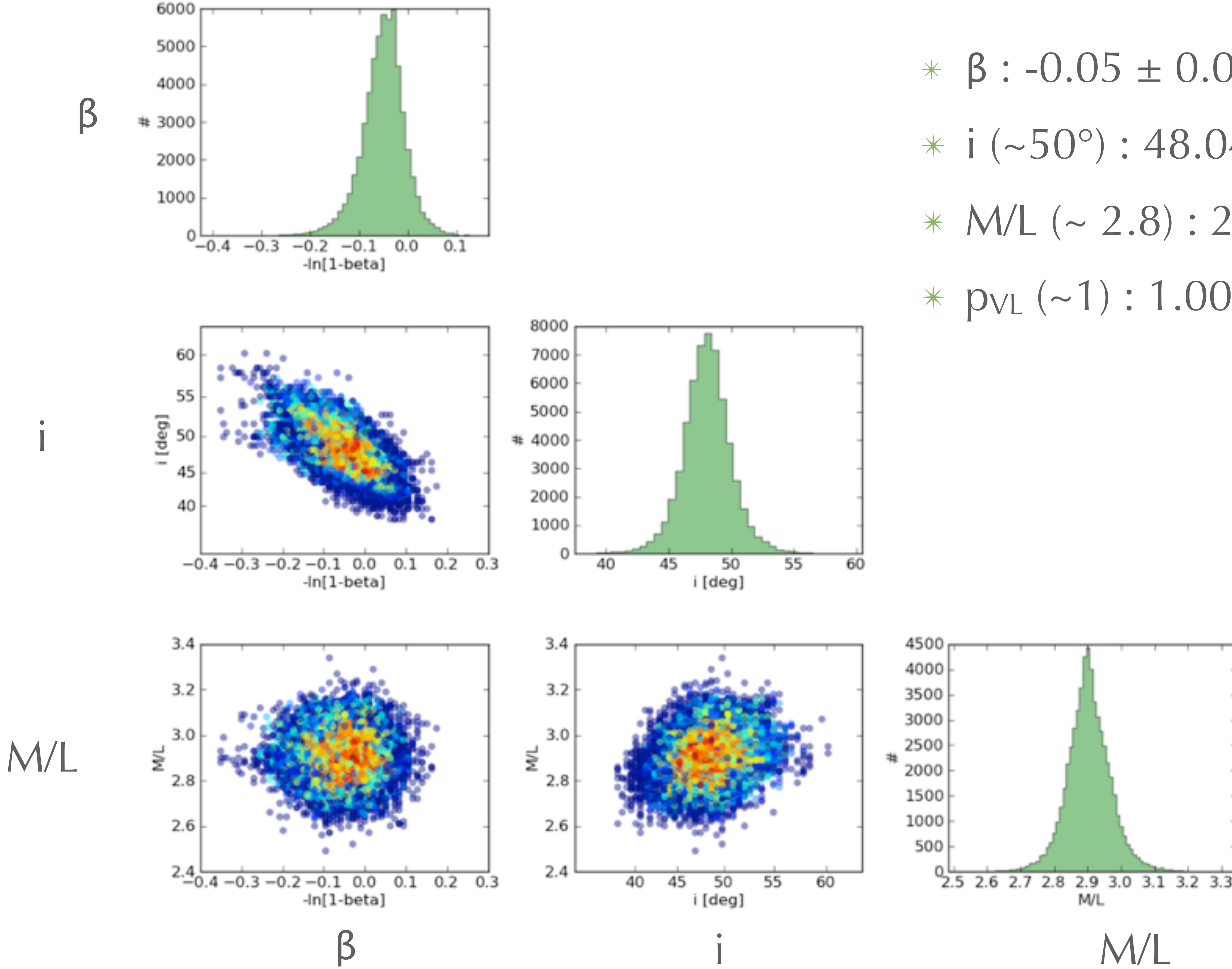

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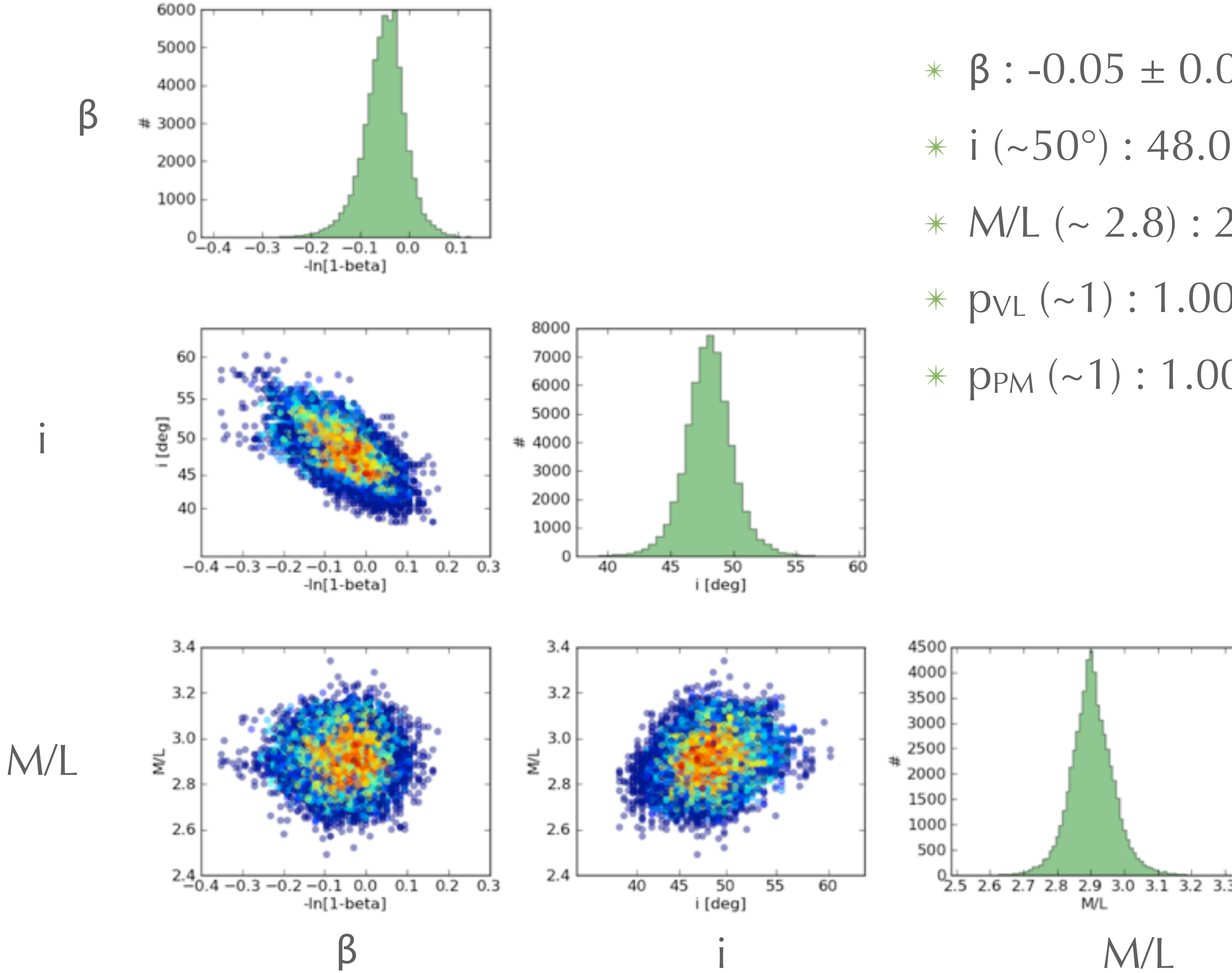

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wish list

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  - add more data (less conservative cuts)

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- preliminary results looks promising!