

Análise do Espectro de Potência Angular para o catálogo SDSS

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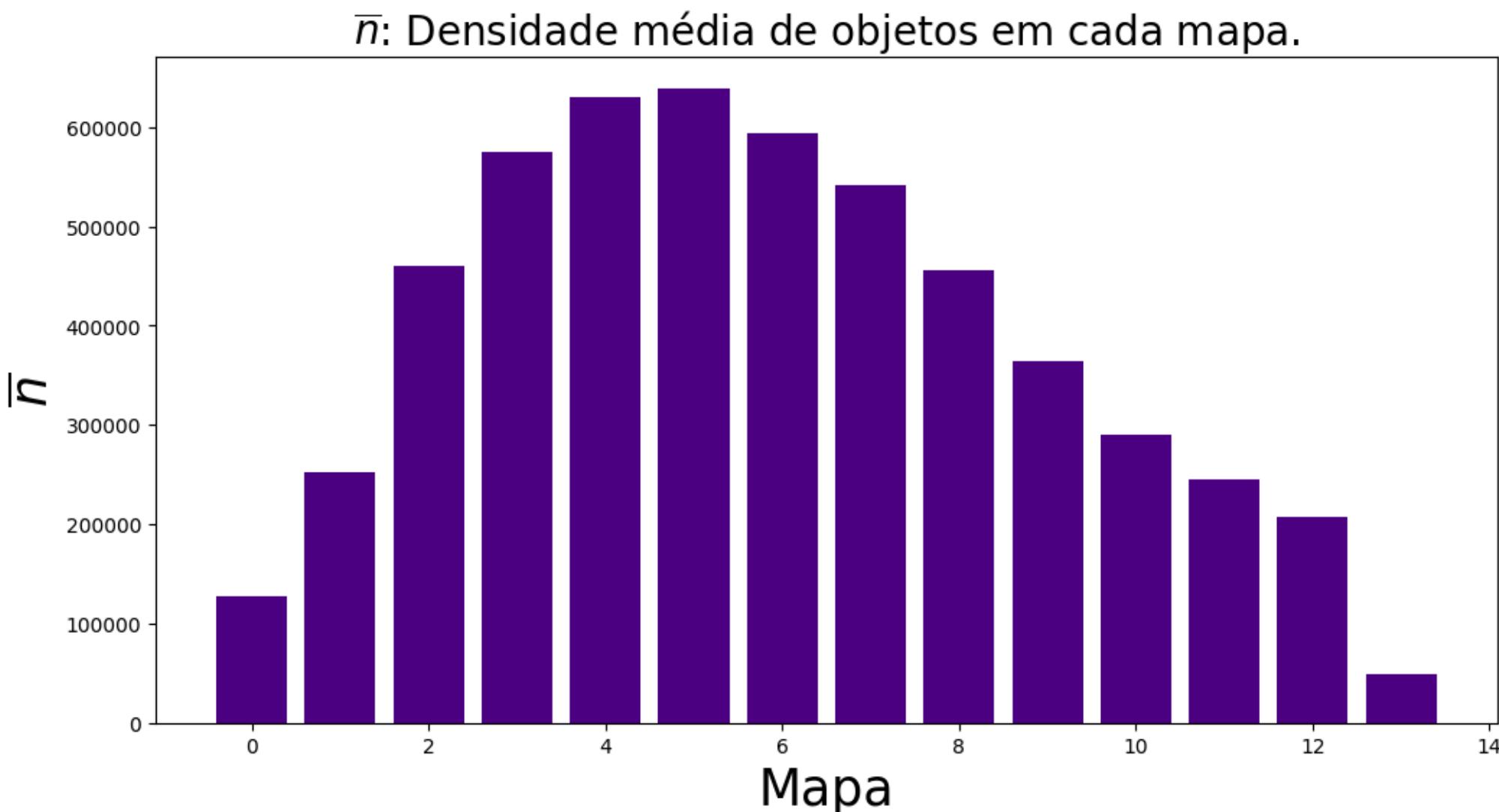
- Dados SDDS LOWz DR12 (Rivera et al. 2018);
- Objetos de observação: Galaxias com redshift entre $0.000 < z \leq 0.400$;
- Construção de mapas de densidade e sobredensidade;
- Pseudo- $S\ell$ e distribuição de objetos $n(z)$;
- Simulações log-normais (FLASK)
- Convolução com Matriz mistura e Binagem;
- Construção da Matriz de covariância;
- Análise de dados através de Monte Carlo via Cadeia de Markov;

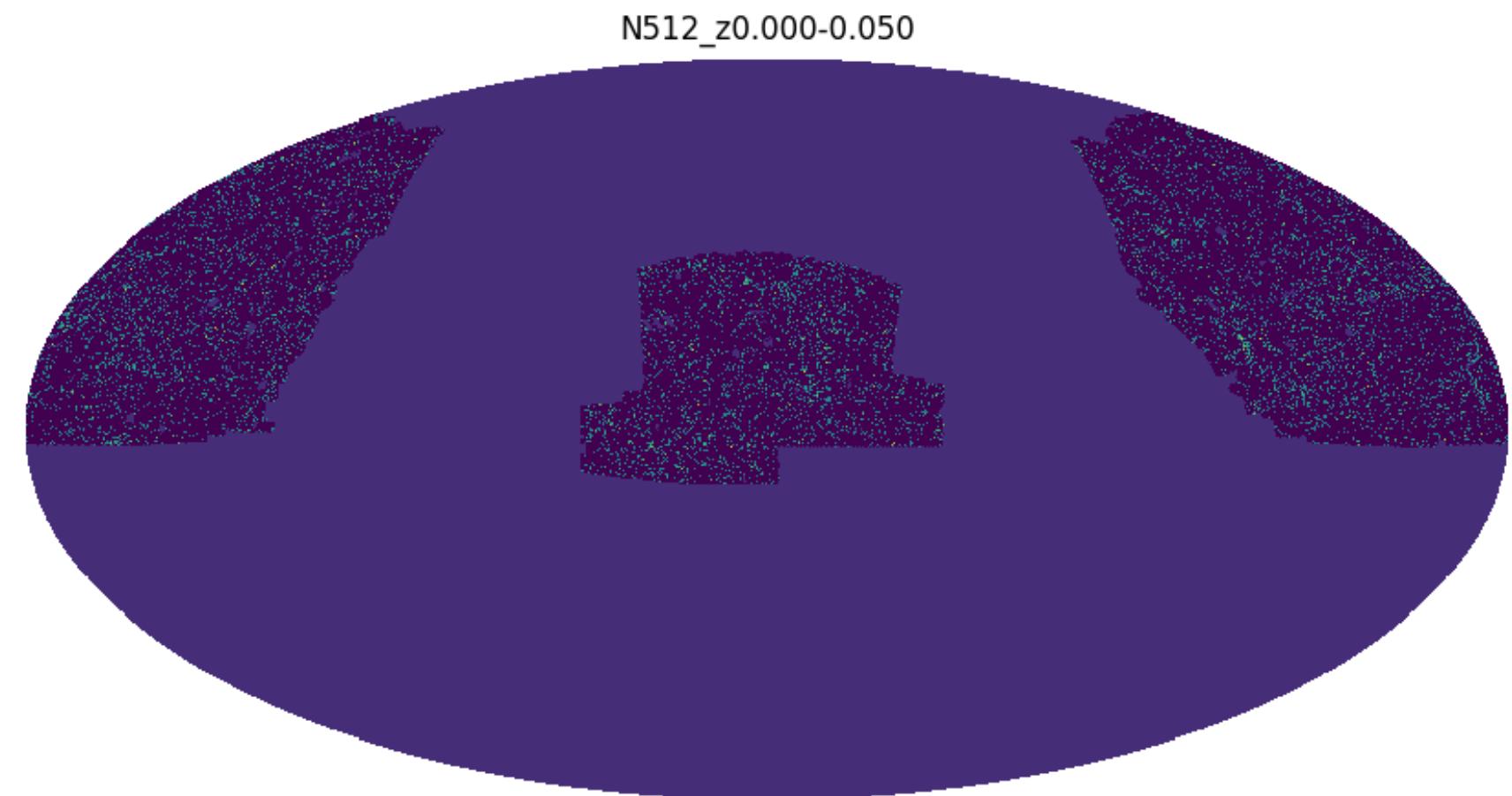
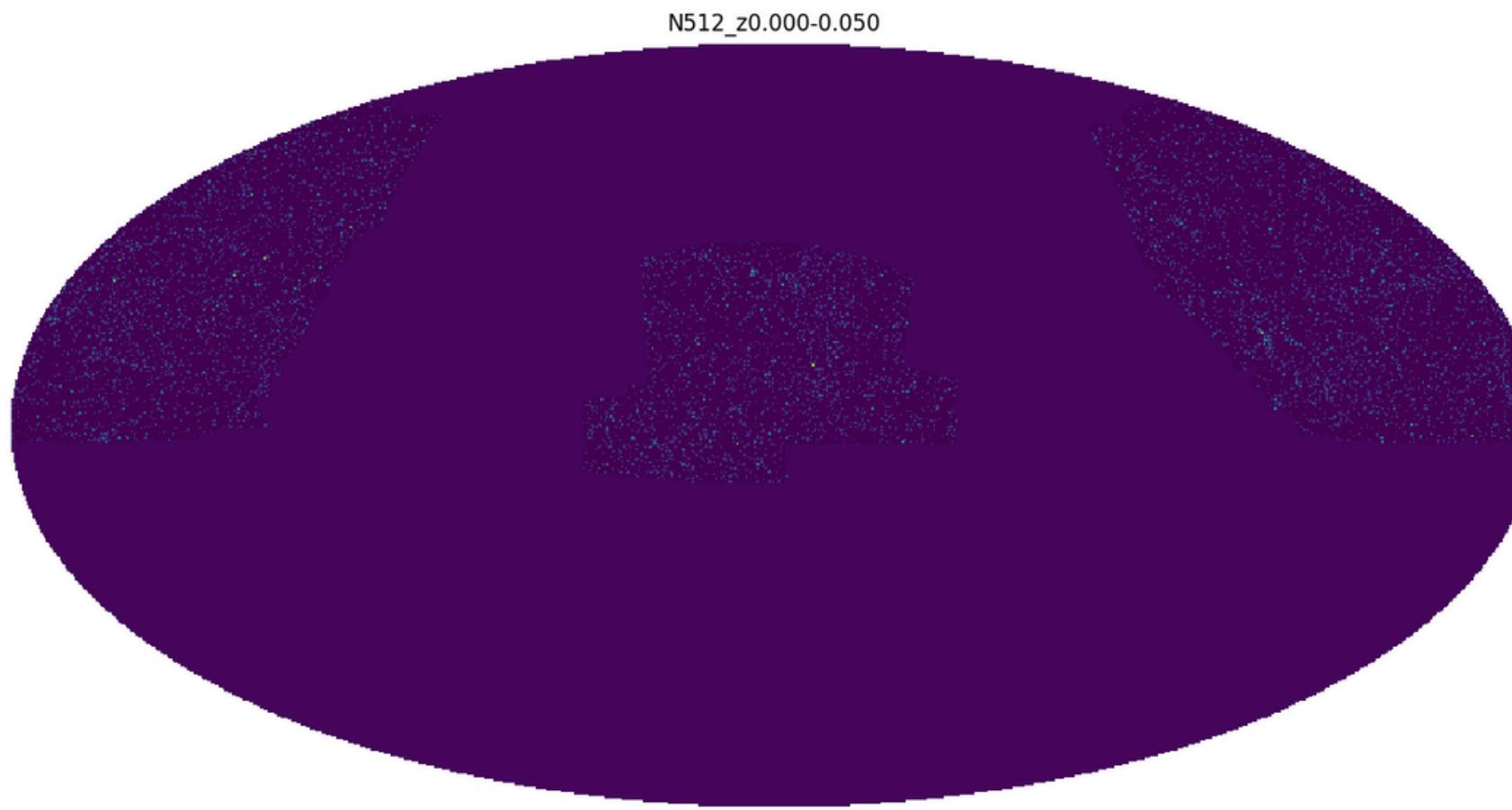
$$\Pr(\Theta, \nu | \hat{S}_{\Delta\ell}, \mathcal{M}) = \frac{\mathcal{L}(\hat{S}_{\Delta\ell} | \Theta, \nu, \mathcal{M}) \pi(\Theta, \nu)}{Z(\hat{S}_{\Delta\ell} | \mathcal{M})}$$

- Análise dos resultados.

Mapa	Redshift	Nº Objetos
0	0,000 - 0,050	127965
1	0,050 - 0,075	253058
2	0,075 - 0,100	460207
3	0,100 - 0,125	575762
4	0,125 - 0,150	629783
5	0,150 - 0,175	639377
6	0,175 - 0,200	593565

Mapa	Redshift	Nº Objetos
7	0,200 - 0,225	541703
8	0,225 - 0,250	456173
9	0,250 - 0,275	364873
10	0,275 - 0,300	289499
11	0,300 - 0,325	245367
12	0,325 - 0,350	207064
13	0,350 - 0,400	49410





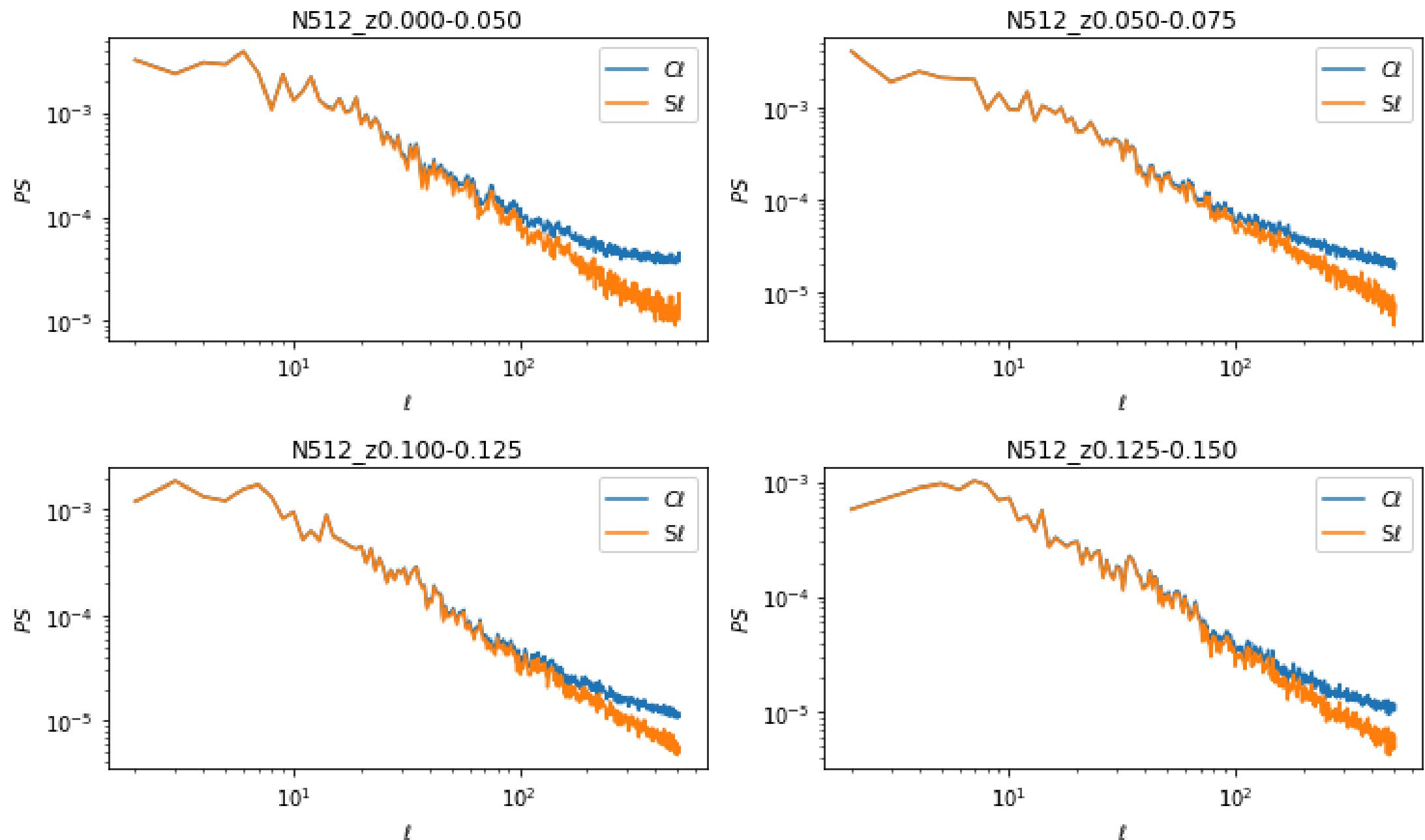
Mapas de sobredensidade, dados pela equação:

$$\delta = \frac{\rho - \bar{\rho}}{\bar{\rho}}$$

$$C_{\ell}^{ij} = \frac{1}{2\ell + 1} \sum_{m=-\ell}^{\ell} C_{\ell m}^{ij}$$

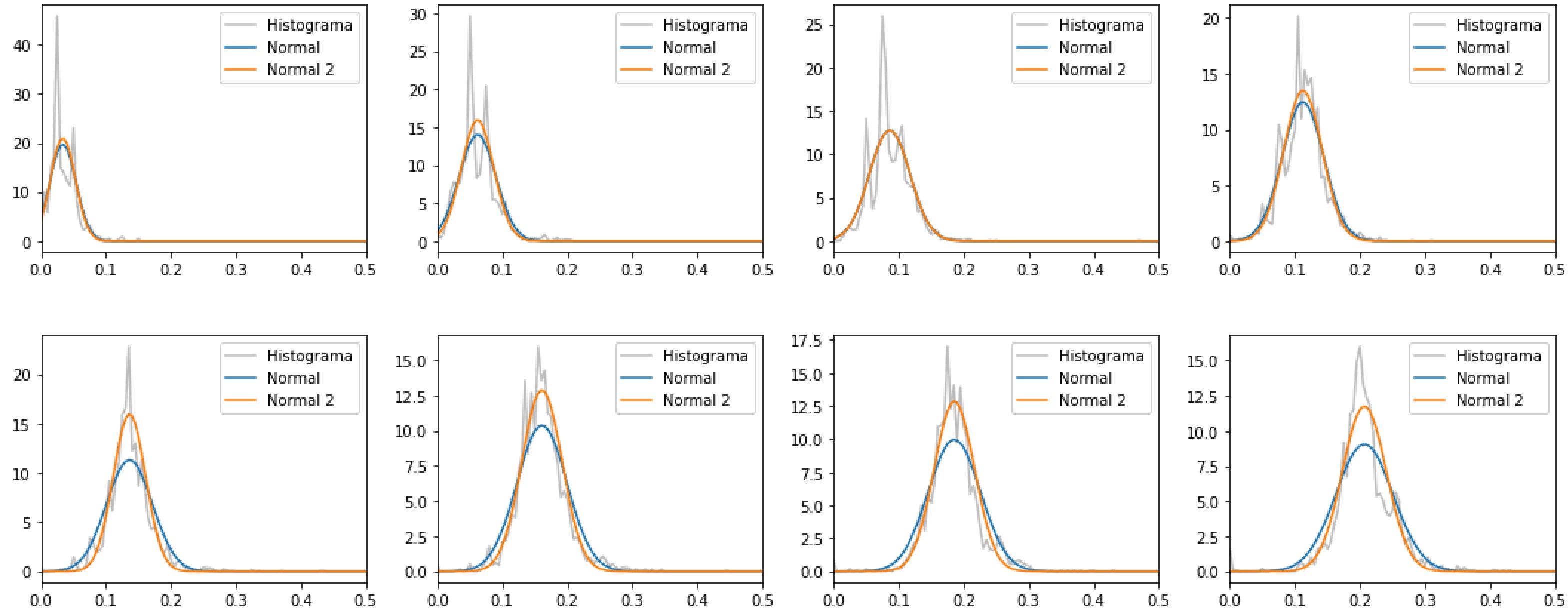
$$N_{\ell} = \frac{\Delta\Omega_{tot}}{n_{tot}} = \frac{1}{\bar{n}}$$

$$S_{\ell}^{ij} = \frac{1}{w_{\ell}^2} \left[\left(\frac{1}{2\ell + 1} \sum_{m=-\ell}^{\ell} C_{\ell m}^{ij} \right) - N_{\ell} \delta_{ij} \right]$$



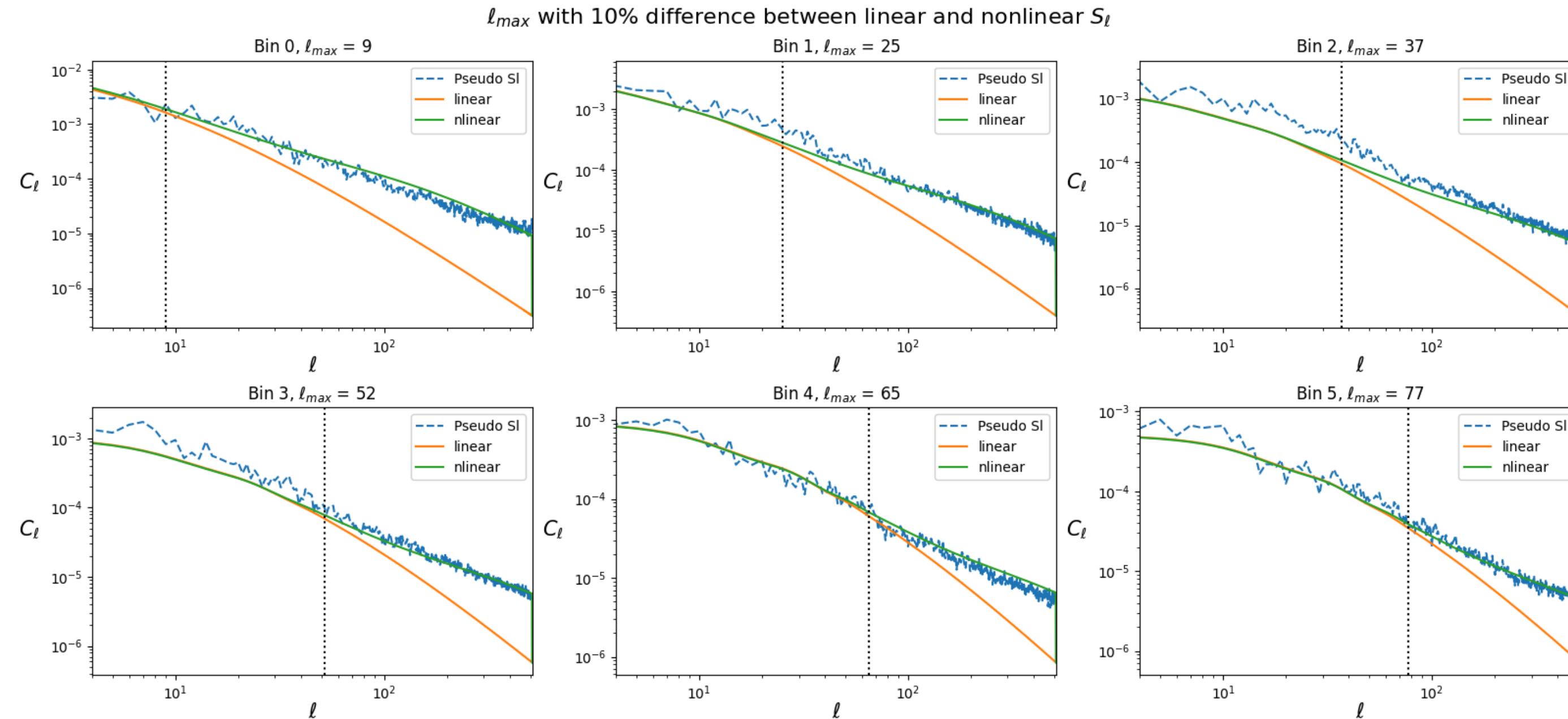
Uso do PseudoPower para geração de C ℓ e S ℓ

Distribuição $n(z)$ - SDSS



Distribuição dos objetos ao longo do intervalo de redshift

Ajuste dos multipolos ℓ - SDSS

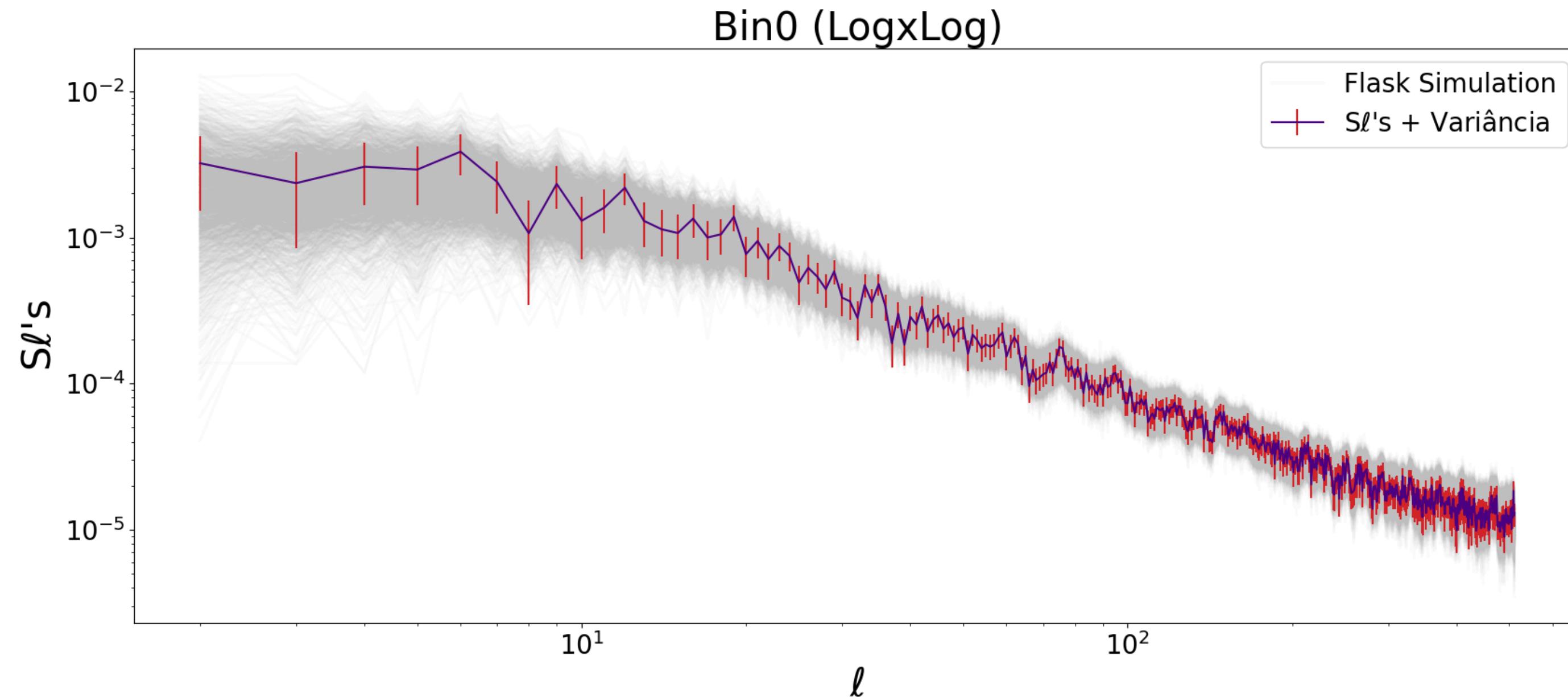


Input das distribuições no UCLCL;

Comparação com o Pseudo $S\ell$;

Ajuste do viés e corte dos multipolos ℓ .

bin	0	1	2	3	4	5	6
ℓ_{\max}	9	25	37	52	65	77	89
bin	7	8	9	10	11	12	13
ℓ_{\max}	99	113	126	136	149	161	174



Uso do FLASK para simular $S_l's$;

20000 simulações realizadas.

Matriz mistura:

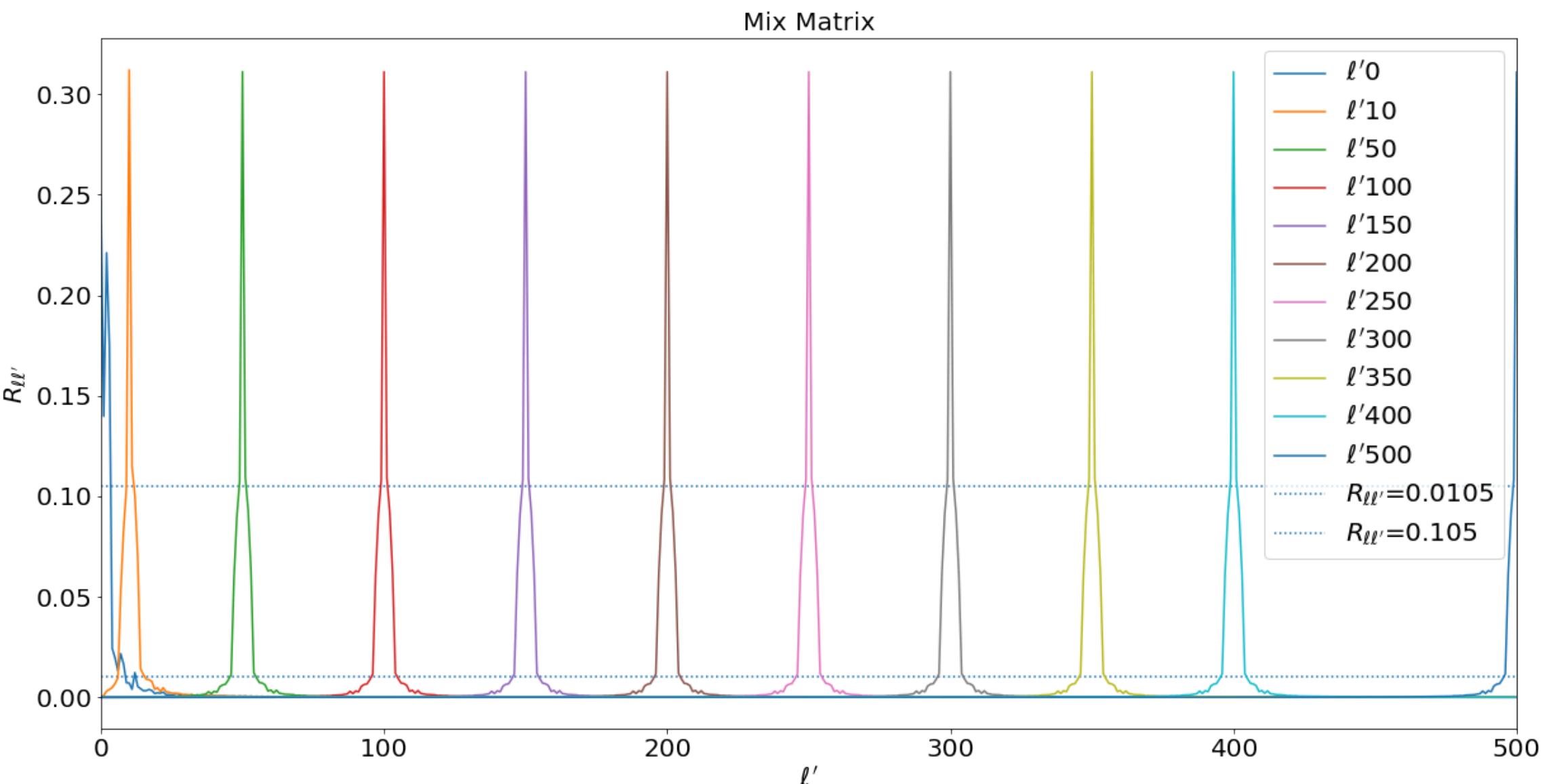
$$R_{\ell\ell'} = \frac{2\ell' + 1}{4\pi} \sum_{\ell''} (2\ell'' + 1) W_{\ell''} \begin{pmatrix} \ell & \ell' & \ell'' \\ 0 & 0 & 0 \end{pmatrix}$$

Binagem:

$$S_{\Delta\ell}^{ij} = \frac{1}{\sum_{\ell'}^{\ell'+\Delta\ell} (2\ell+1)} \sum_{\ell'}^{\ell'+\Delta\ell} (2\ell+1) S_{\ell}^{ij}$$

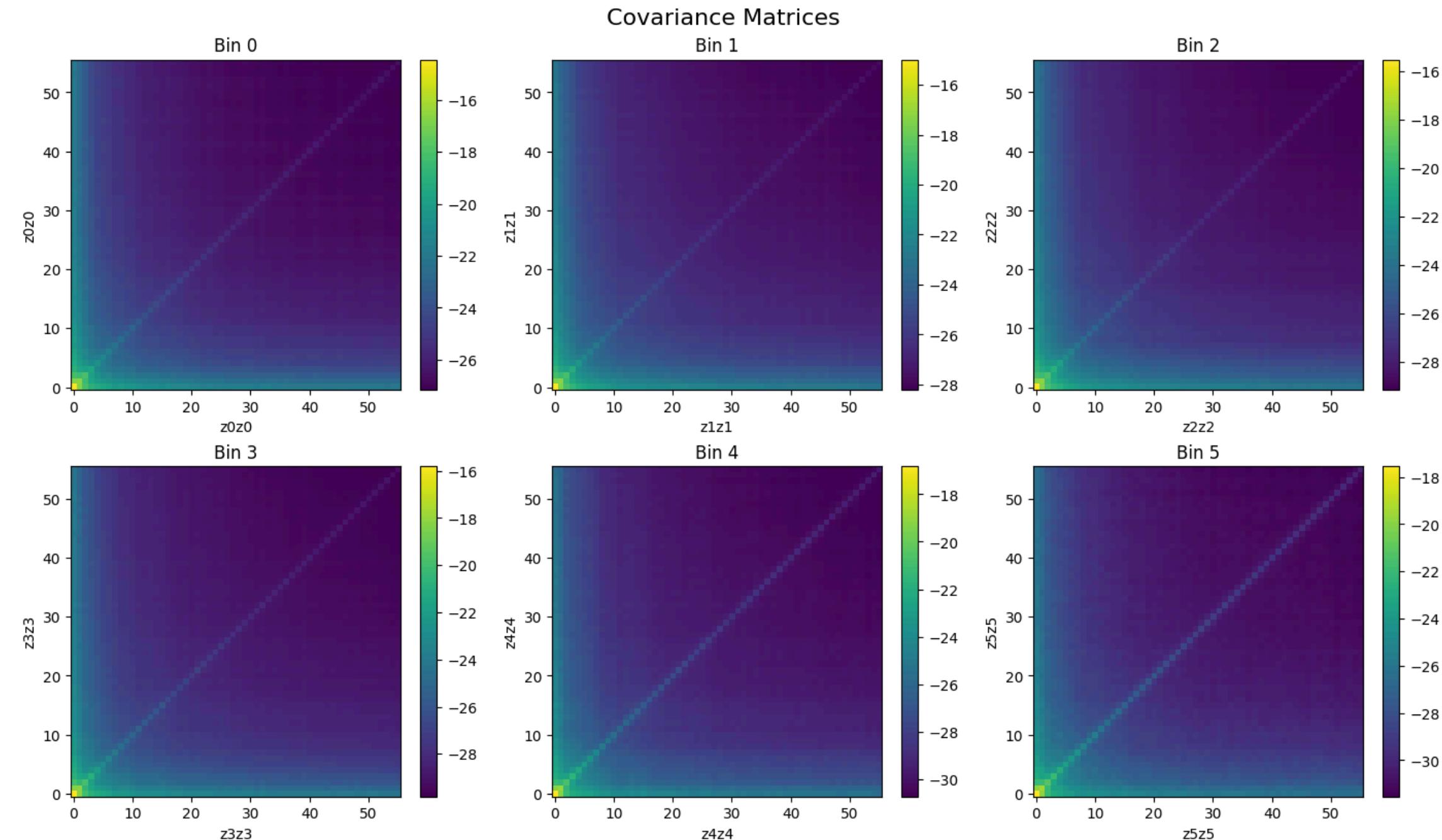
$$\Delta\ell = 9$$

Matriz 512×512 para 56×56



Covariância entre dois bins:

$$S_{\ell\ell'}^{ij} = \frac{1}{N_s - 1} \sum_{s=0}^{N_s} (S_{\ell}^{ij,s} - \langle S_{\ell}^{ij,s} \rangle) (S_{\ell'}^{ij,s} - \langle S_{\ell'}^{ij,s} \rangle)^T$$

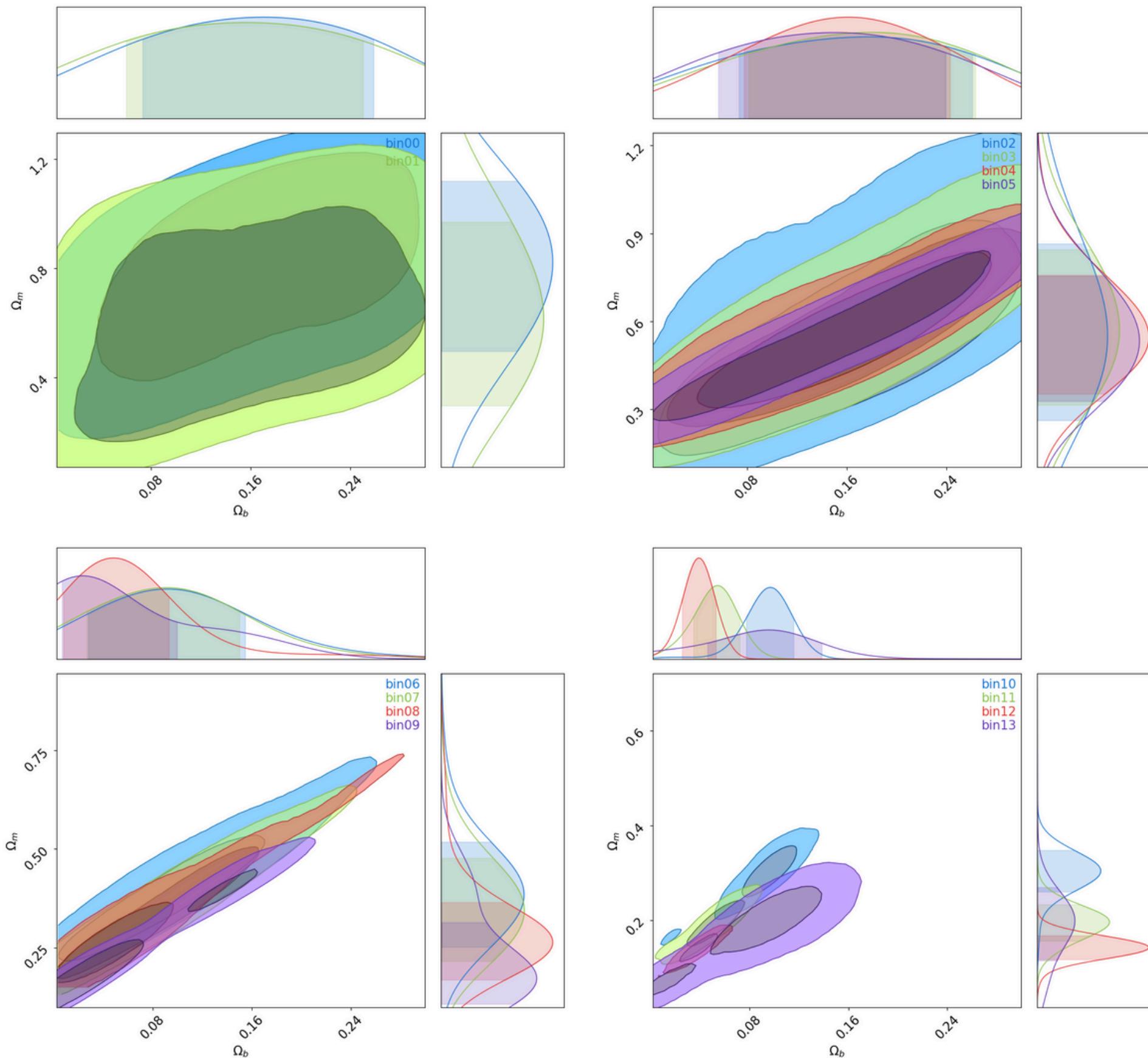


Cosmologia e parâmetros:

Parâmetro	Δ Prior	Valor fixado
h	0,55 ; 0,91	0,6737
Ω_b	0,001 ; 0,3	0,04920
Ω_{cdm}	0,0 ; 1,0	0,2640
τ_{reio}	0,01 ; 0,2	0,0544
$\ln 10^{10} A_s$	0,5 ; 5,0	3,045
n_s	0,87 ; 1,07	0,96605
bin _n bias	0,5 ; 2,0	—

Parâmetros amostrados:

Ω_b , Ω_c e Ω_m ,
 $\Omega_m = \Omega_b + \Omega_c$.

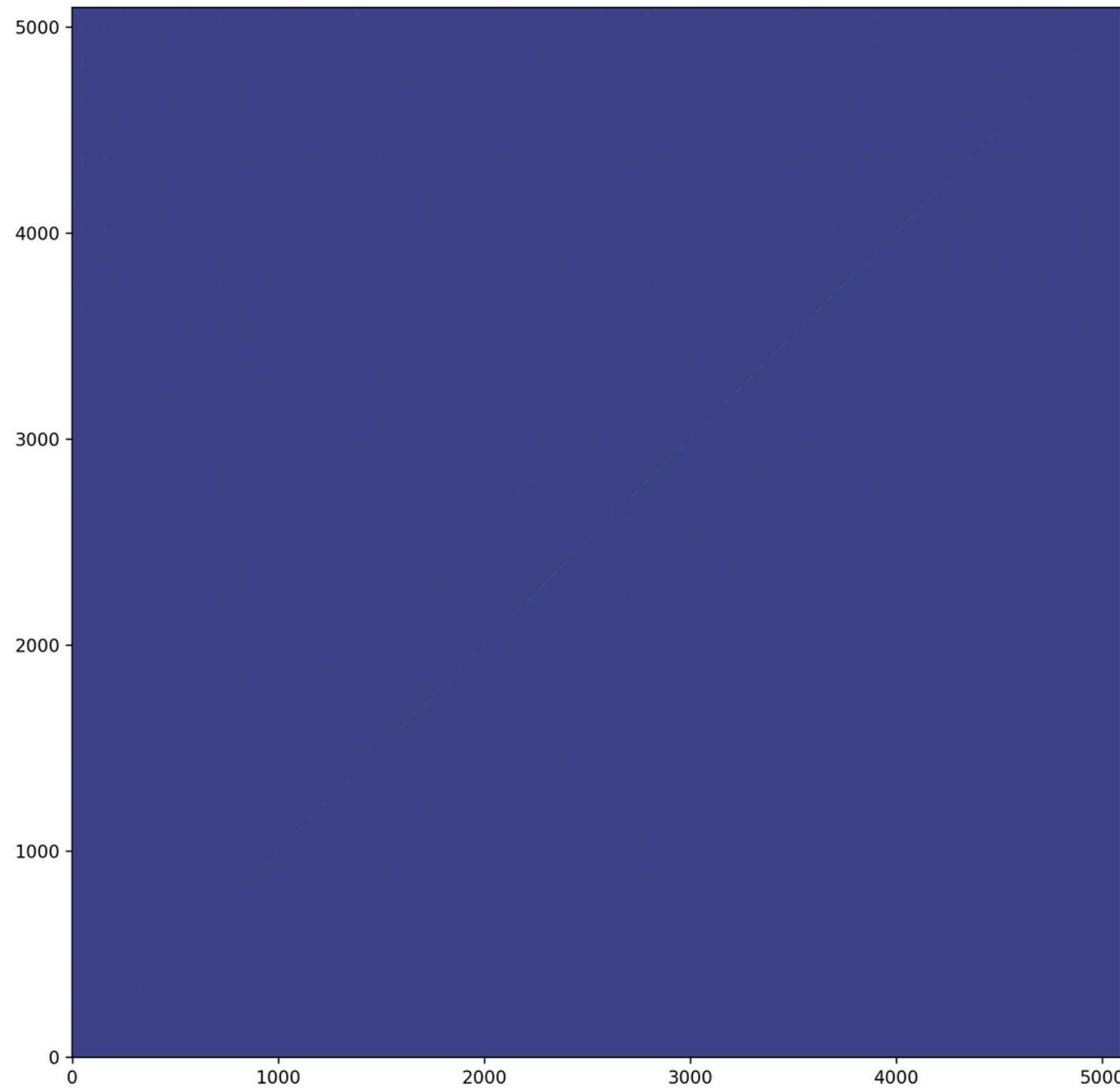


Parâmetro	Bin 00	Bin 01		
Ω_b	$0.171^{+0.088}_{-0.098}$	$0.156^{+0.094}_{-0.096}$		
Ω_m	$0.83^{+0.30}_{-0.33}$	$0.62^{+0.35}_{-0.32}$		
—	Bin 02	Bin 03	Bin 04	Bin 05
Ω_b	$0.177^{+0.083}_{-0.104}$	$0.180^{+0.083}_{-0.099}$	$0.162^{+0.081}_{-0.084}$	$0.150^{+0.089}_{-0.093}$
Ω_m	$0.55^{+0.31}_{-0.29}$	$0.57^{+0.28}_{-0.25}$	$0.55^{+0.21}_{-0.19}$	$0.53^{+0.22}_{-0.21}$
—	Bin 06	Bin 07	Bin 08	Bin 09
Ω_b	$0.092^{+0.063}_{-0.064}$	$0.091^{+0.059}_{-0.064}$	$0.049^{+0.045}_{-0.040}$	$0.024^{+0.075}_{-0.017}$
Ω_m	$0.38^{+0.14}_{-0.13}$	0.34 ± 0.13	$0.265^{+0.100}_{-0.097}$	$0.170^{+0.143}_{-0.064}$
—	Bin 10	Bin 11	Bin 12	Bin 13
Ω_b	$0.097^{+0.019}_{-0.020}$	$0.054^{+0.018}_{-0.019}$	$0.039^{+0.014}_{-0.013}$	$0.095^{+0.044}_{-0.049}$
Ω_m	0.304 ± 0.044	$0.197^{+0.037}_{-0.041}$	$0.142^{+0.026}_{-0.025}$	$0.198^{+0.072}_{-0.083}$

Resultados dos parâmetros
amostrados por MCMC via UCLCL

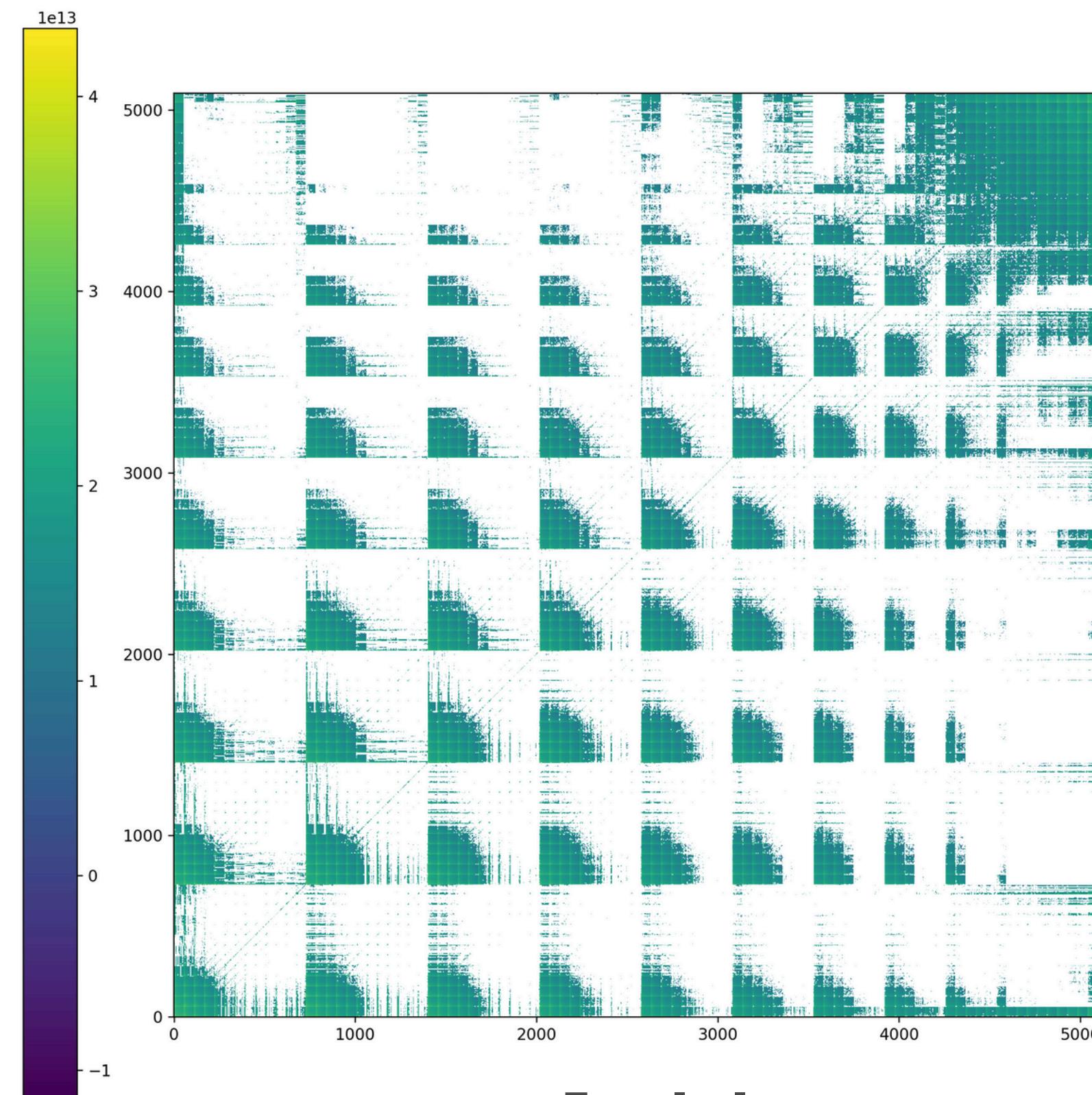
Covariância Completa - SDSS

bin0 - bin12 CovMatrix



Matriz simulada

bin0 - bin12 CovMatrix



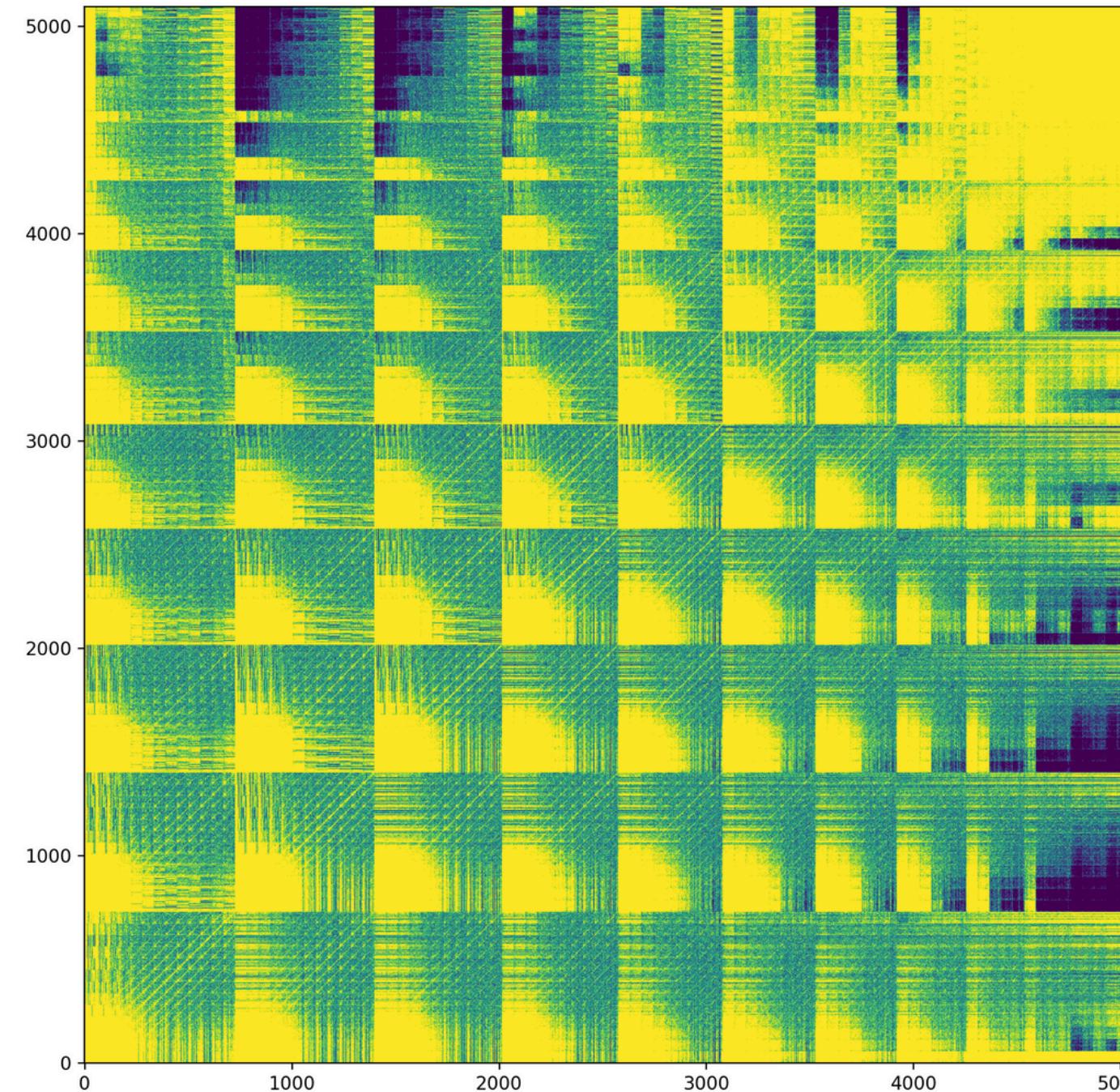
Escala log

32º

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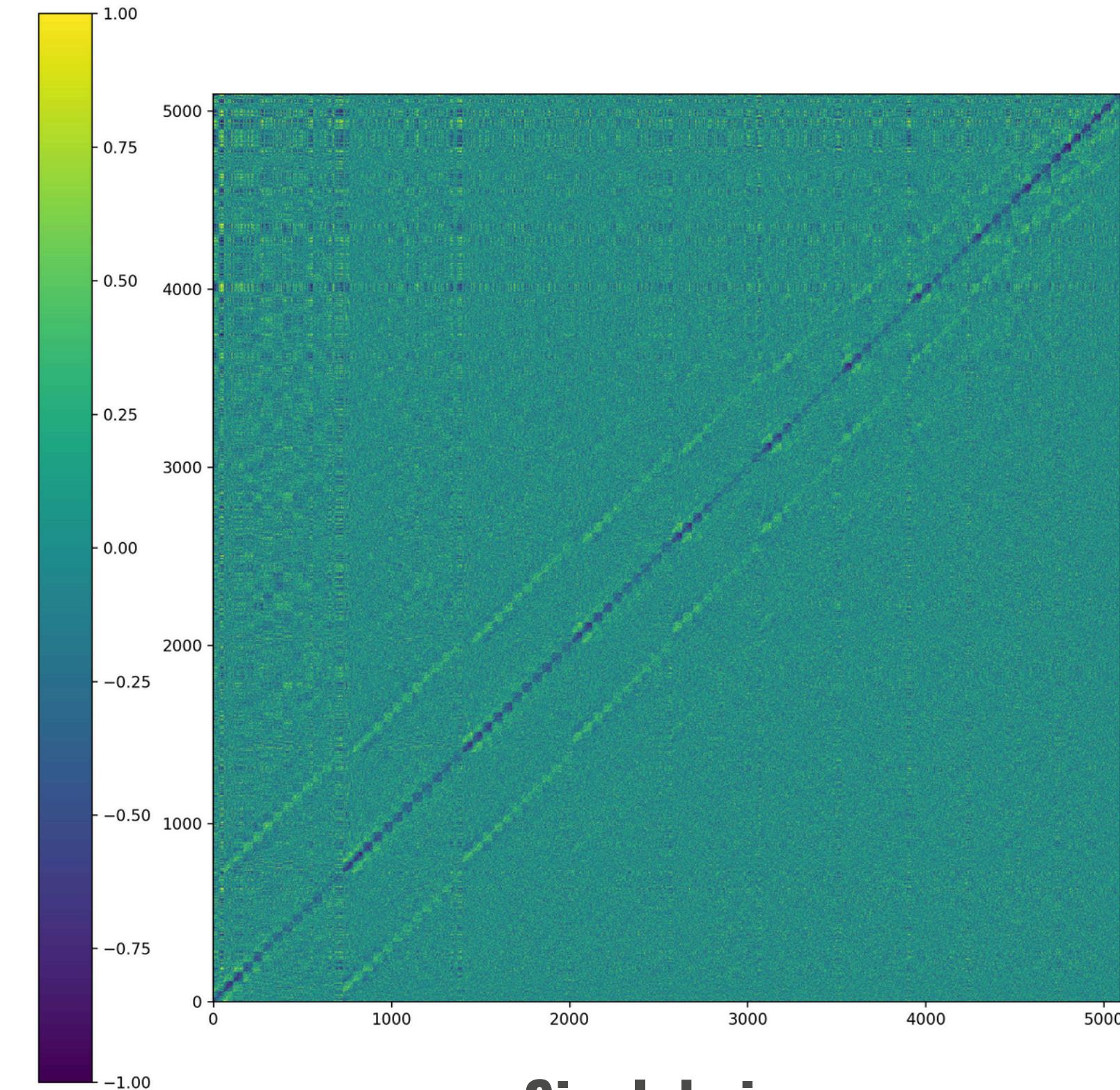
Covariância Completa - SDSS

bin0 - bin12 CovMatrix



Sinal da matriz

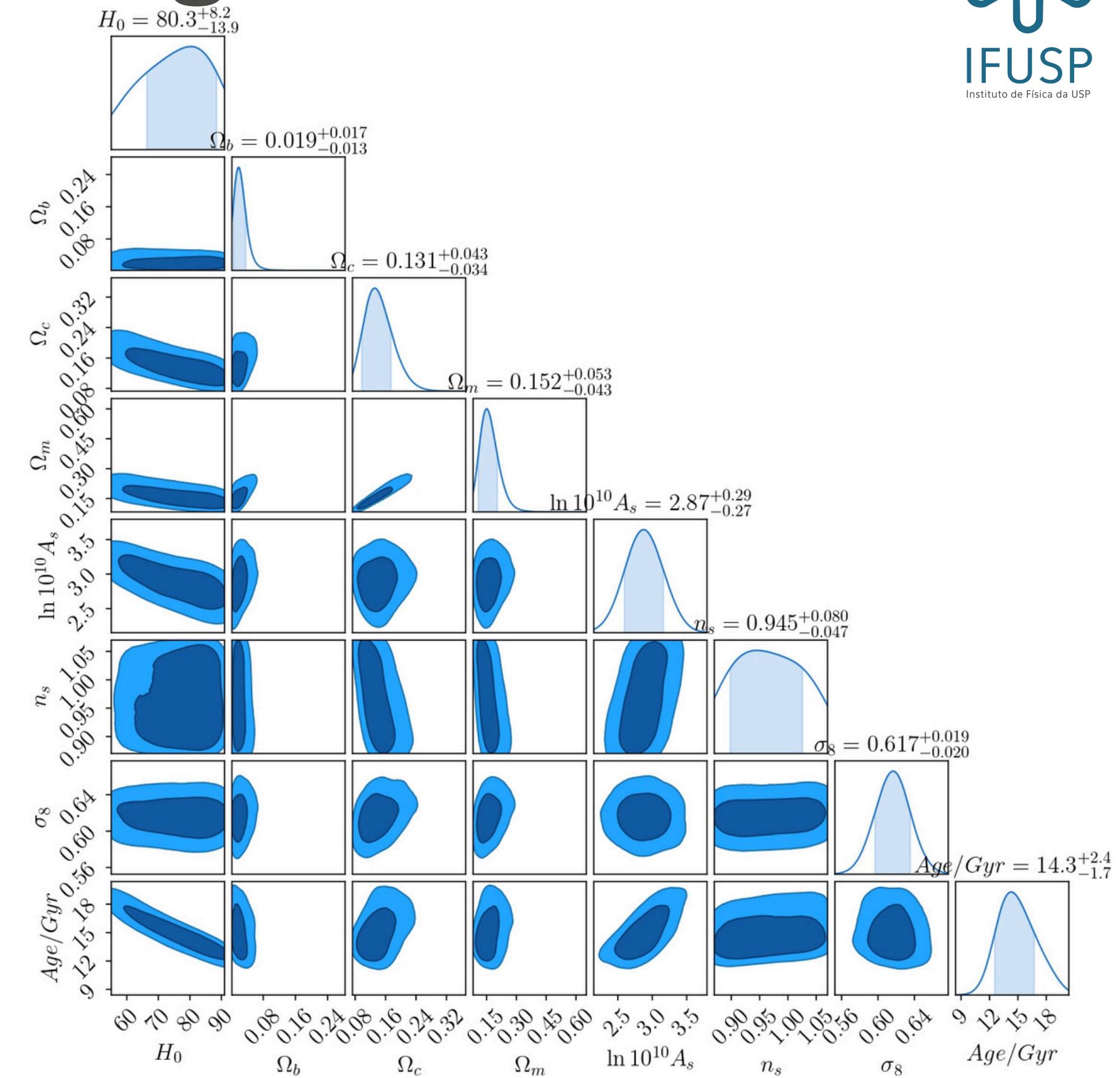
bin0 - bin12 CovMatrix



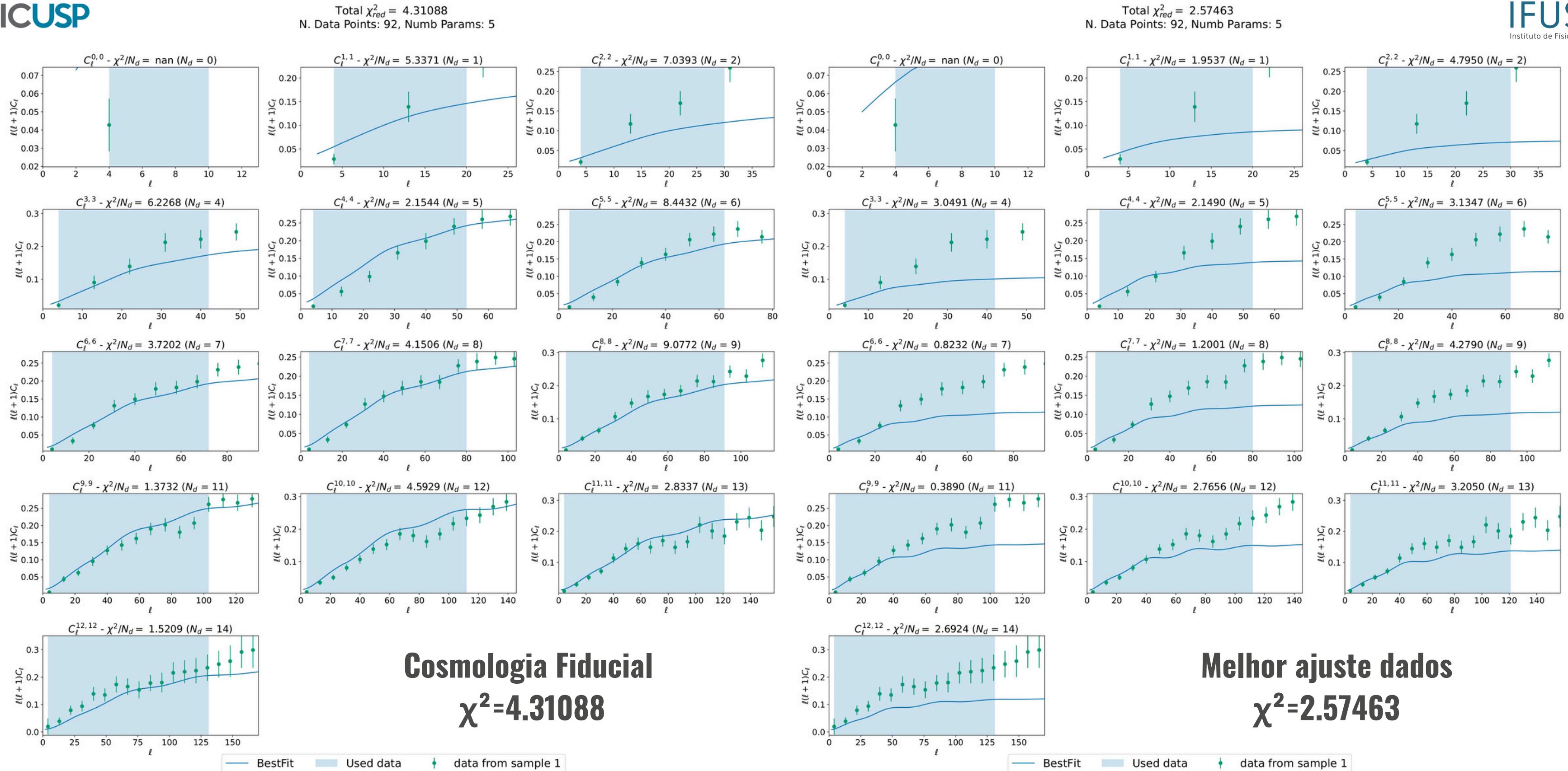
Sinal da inversa

Resultados Cosmológicos - SDSS

Parâmetro	MCMC	Valor Planck (2018)
H_0	$80.3^{+8.2}_{-13.9}$	$67.4^{+0.5}_{-0.5}$
Ω_b	$0.019^{+0.017}_{-0.013}$	$0.0224^{+0.0001}_{-0.0001}$
Ω_{cdm}	$0.131^{+0.043}_{-0.034}$	$0.120^{+0.001}_{-0.001}$
Ω_m	$0.152^{+0.053}_{-0.043}$	$0.315^{+0.007}_{-0.007}$
$\ln 10^{10} A_s$	$2.87^{+0.29}_{-0.27}$	$3.045^{+0.015}_{-0.018}$
n_s	$0.945^{+0.080}_{-0.047}$	$0.948^{+0.015}_{-0.018}$
σ_8	$0.617^{+0.036}_{-0.048}$	$0.811^{+0.006}_{-0.006}$
Age/Gyr	$14.3^{+2.4}_{-1.7}$	$13.8^{+0.02}_{-0.02}$



Resultados Cosmológicos - SDSS



Agradecimentos



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