Apresentação Geral

Luiza Olivieri Ponte

Índice:

01

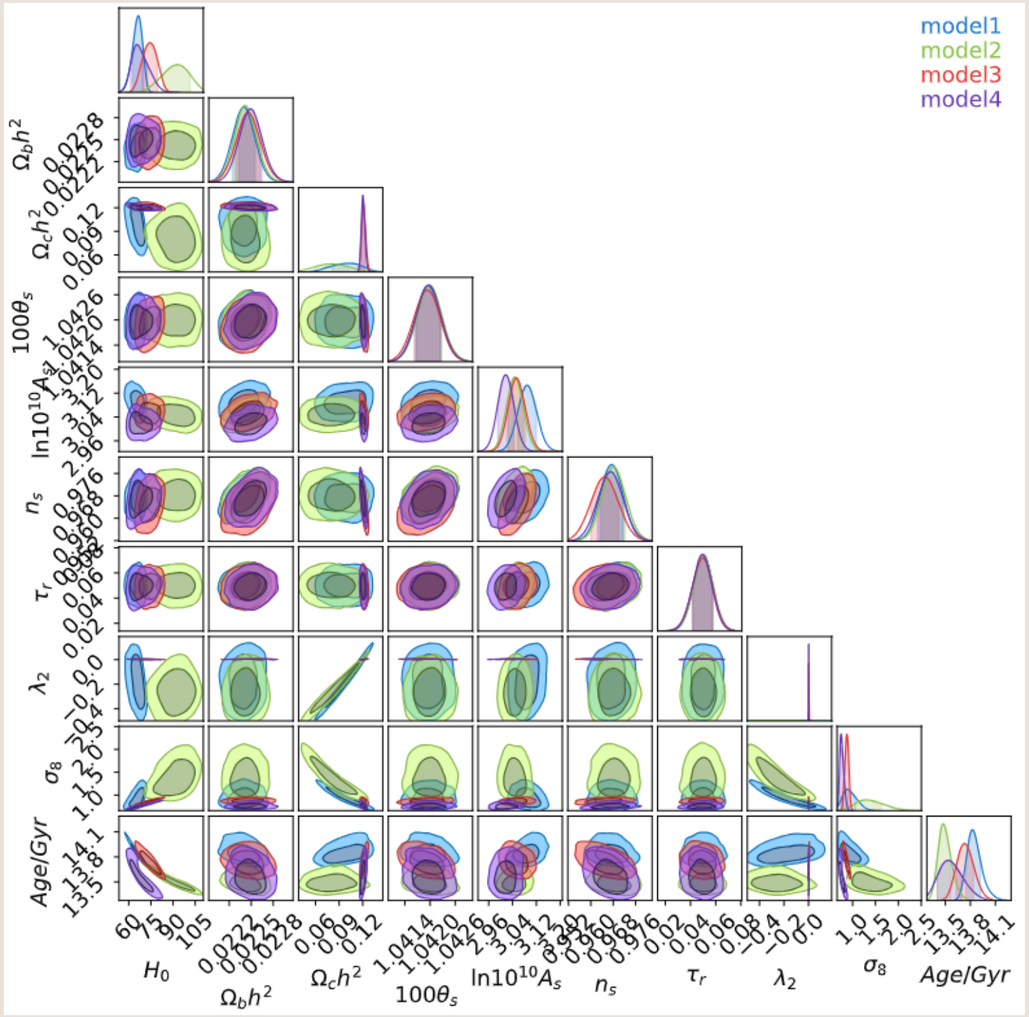
Forecast

Paper: Gabriel / CNPq

Timeline

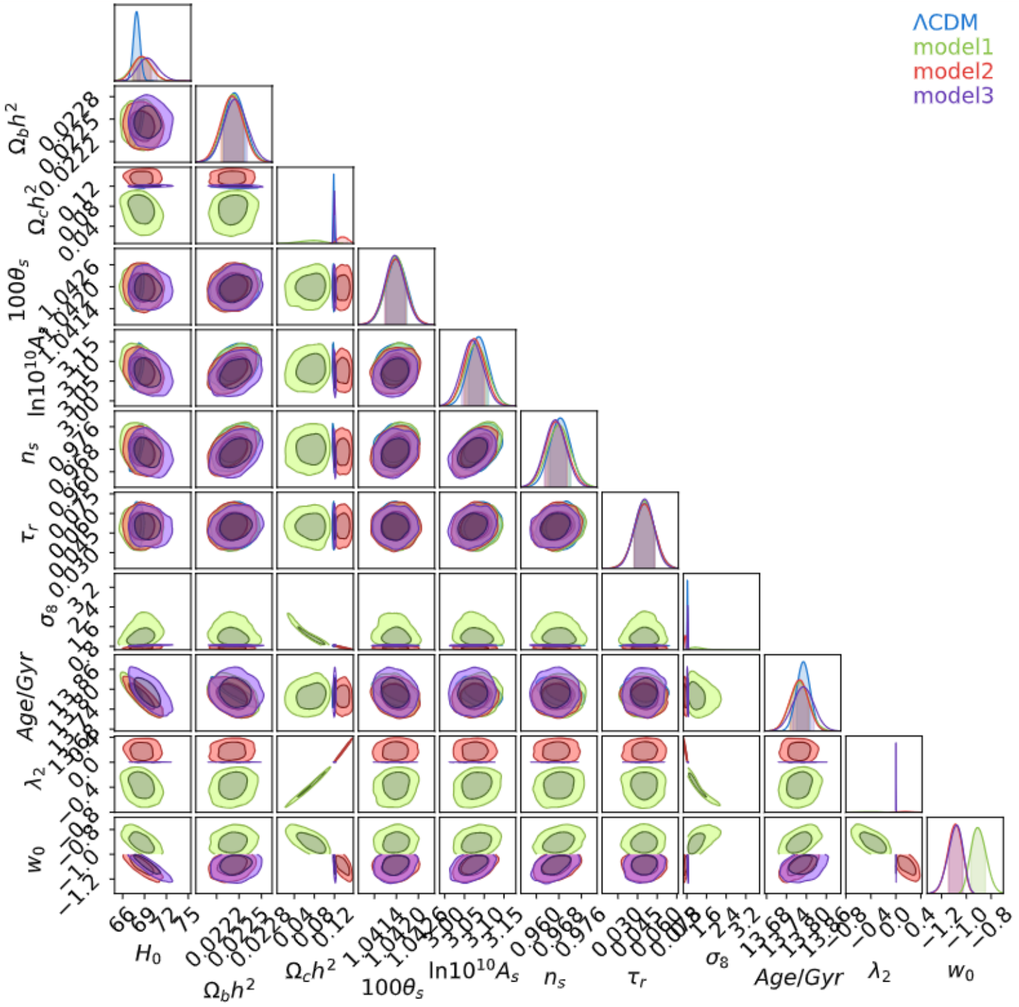
Maio/2022	Entrei no grupo e o Gabriel me explicou o UCLCl
Set/2022	Comecei meu projeto da CNPq rodando os 3 modelos de interação
Mar/2023	Relatório parcial, tinha as rodadas dos 3 modelos com CMB
Set/2023	Relatório final, tinha as rodadas dos 3 modelos com CMB + BAO
Out/2023	Apresentei no SIICUSP os resultados do projeto - slide
Mar/2024	Apresentei no SIICUSP os resultados do projeto - poster

Projeto CNPq



CMB

Parâmetro	ΛCDM	Modelo 1	Modelo 2	Modelo 3	Modelo 4
H_0	67.21	67.49	100.70	83.06	77.47
$\Omega_b h^2$	0.0224	0.0224	0.0224	0.0225	0.0224
$\Omega_c h^2$	0.120	0.113	0.120	0.119	0.120
$100\theta_S$	1.042	1.042	1.042	1.042	1.042
$ln(10^{10} A_s)$	3.061	3.070	3.036	3.056	3.005
n_s	0.965	0.965	0.970	0.969	0.966
τ	0.050	0.055	0.053	0.050	0.052
λ_i	0.2516	-0.9809	-1.9438	-1.4715	0.0006
ω_0	-	-0.061	0.013	0.0003	-2.256
σ_8	0.818	0.856	1.050	0.942	0.843
Age/Gyr	13.81	13.80	13.43	13.57	13.40

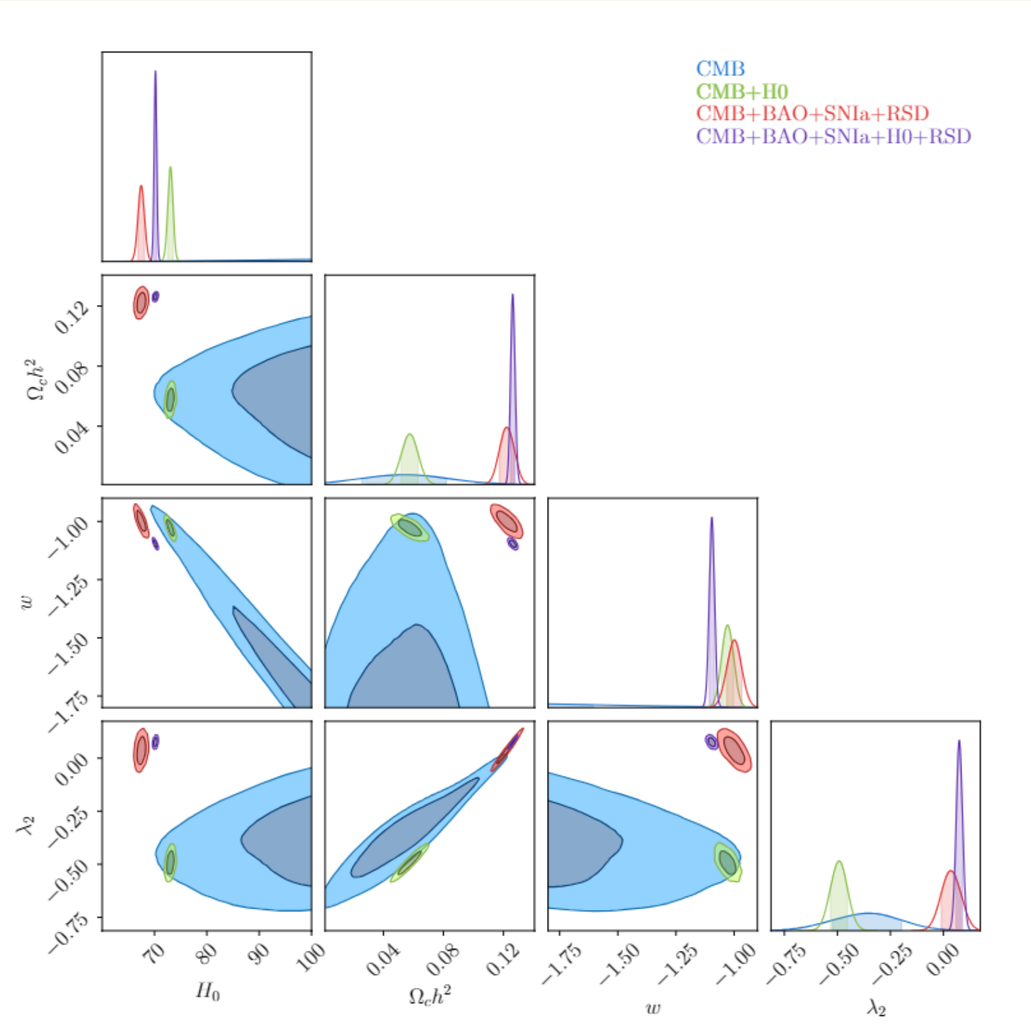


CMB + BAO

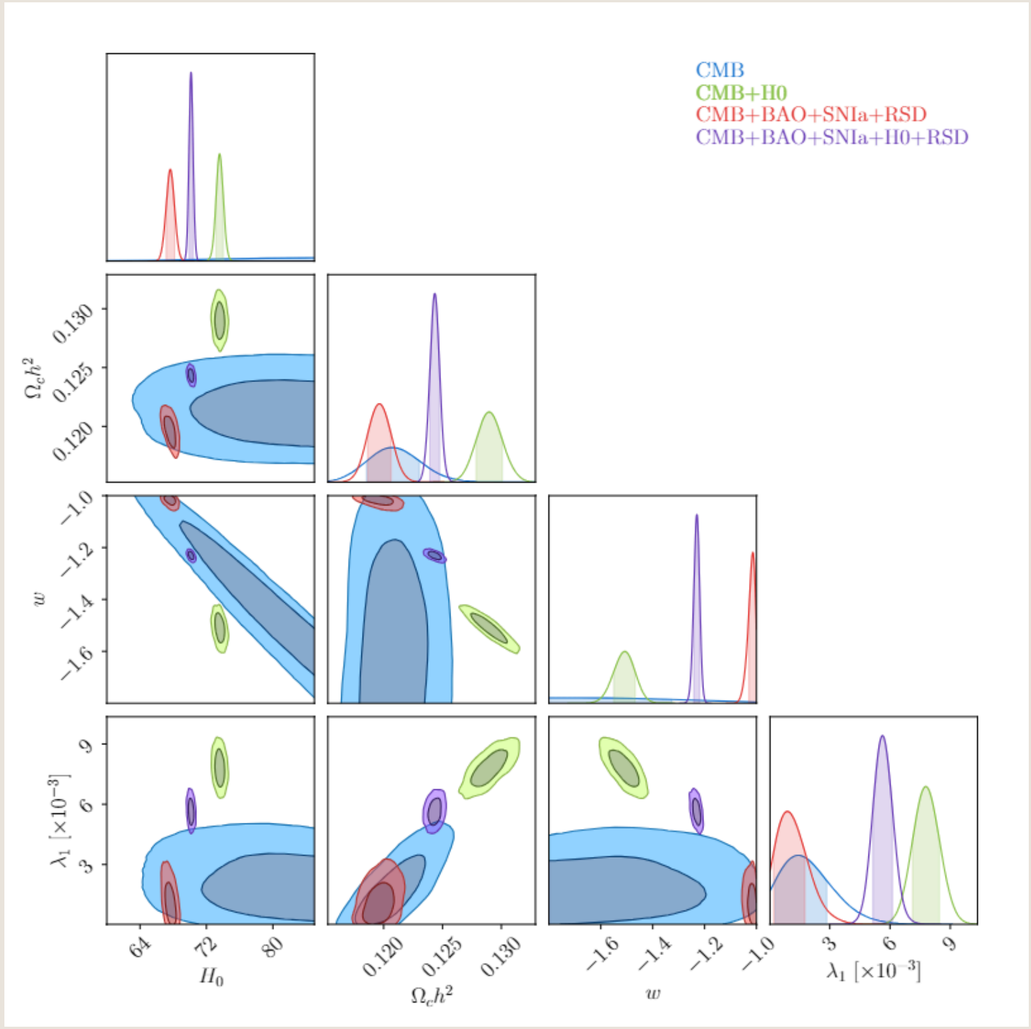
Parâmetro	ΛCDM	Modelo 1	Modelo 2	Modelo 3
H_0	68.06	68.61	68.51	68.65
$\Omega_b h^2$	0.0225	0.0225	0.0224	0.0224
$\Omega_c h^2$	0.118	0.108	0.132	0.119
$100\theta_S$	1.042	1.042	1.042	1.042
$ln(10^{10} A_s)$	3.074	3.076	3.075	3.083
n_s	0.969	0.965	0.968	0.966
τ	0.053	0.051	0.056	0.049
λ_1	0.0480	-0.1051	0.1325	0.0002
ω_0	-	-0.996	-1.068	-1.040
σ_8	0.817	0.896	0.762	0.834
Age/Gyr	13.78	13.78	13.78	13.79

Paper de interação

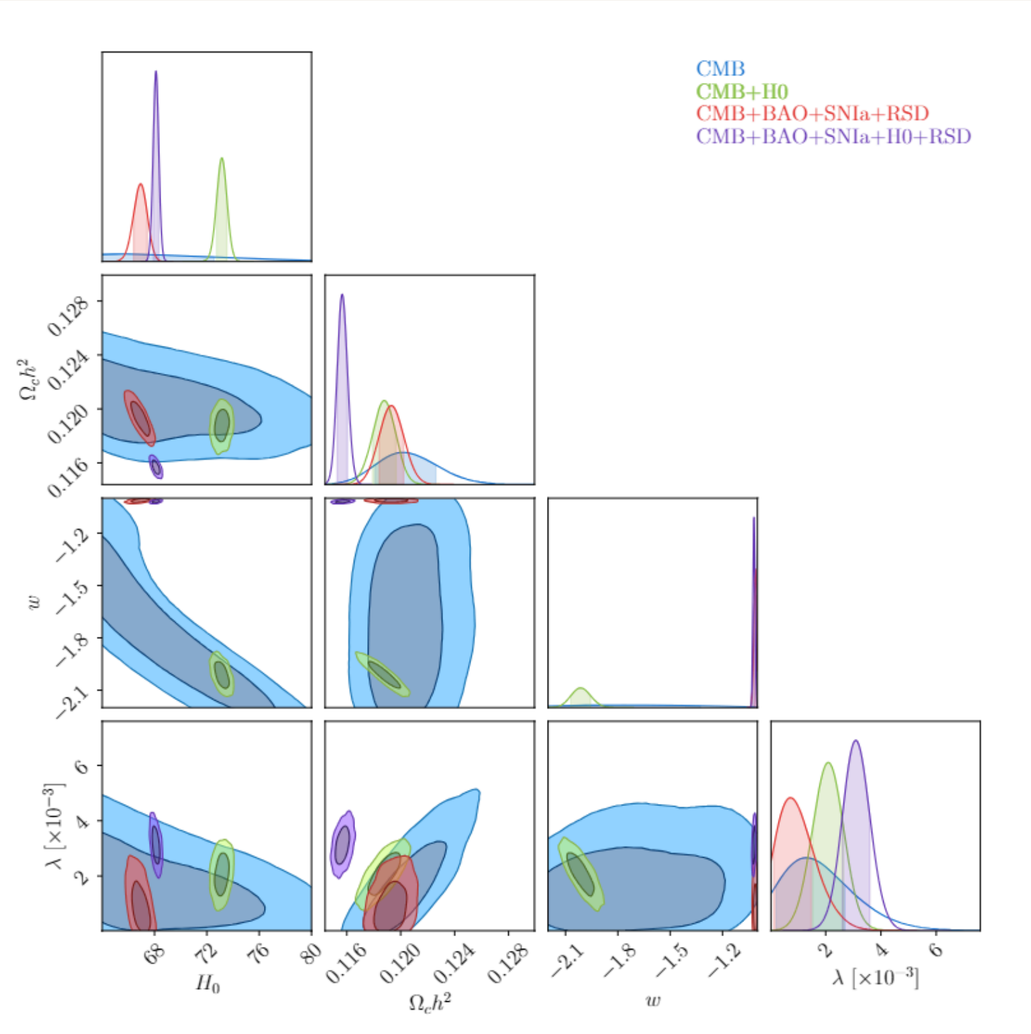
Modelo 1



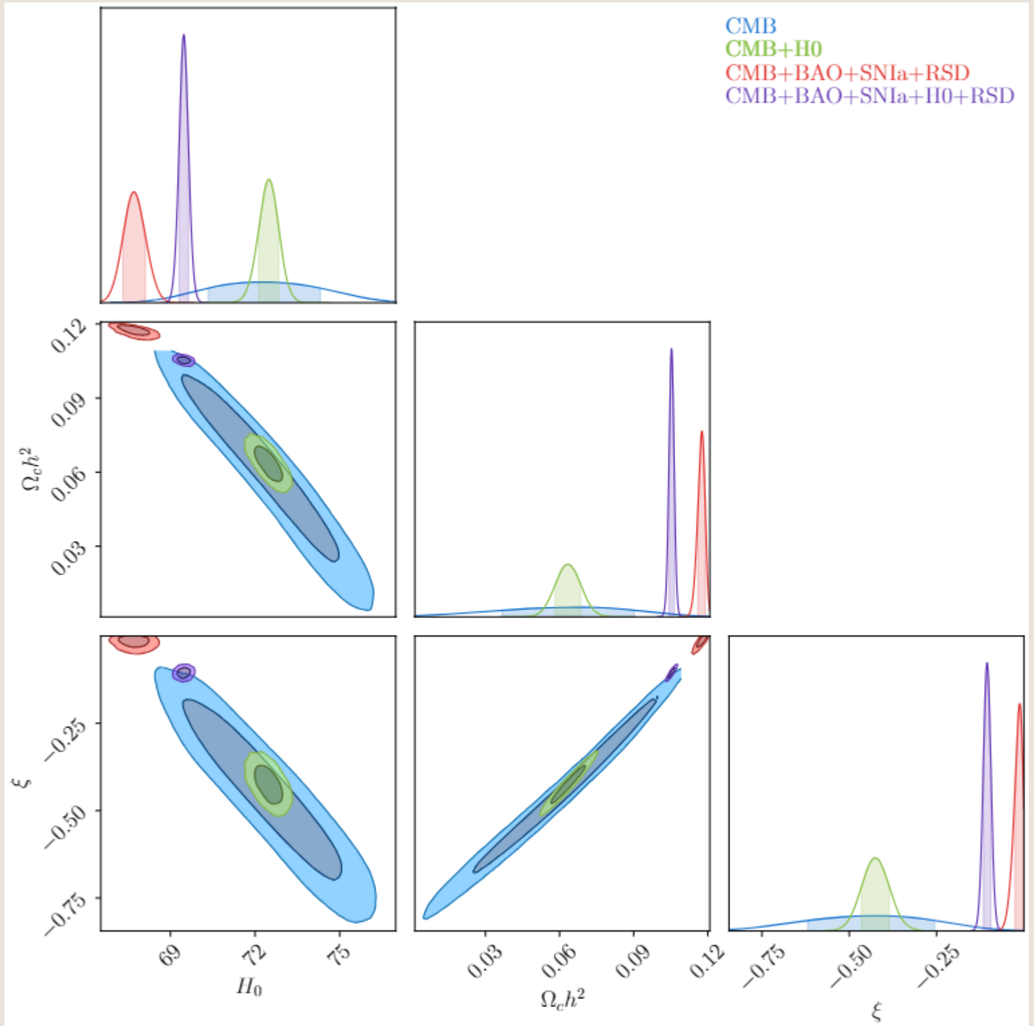
Modelo 2



Modelo 3



Modelo 4



Problema:

TABLE III. $\Delta\chi^2 = \chi^2_{\Lambda\mathrm{CDM}} - \chi^2_{\mathrm{IDE}}$ and evidence level in $2\ln\mathcal{B}$ scale compared to ΛCDM. Datasets 1, 2, 3, and 4 correspond to MCMC runs using the datasets CMB, CMB+BAO+SNIa+RSD, CMB+H_0, and CMB+BAO+SNIa+RSD+H_0 respectively. The χ^2 value for each model was calculated doing $\chi^2 = -2\ln\mathcal{L}$, where $\mathcal{L}$ is the likelihood at the convergence of the chain.

Model	Dataset 1		Dataset 2		Dataset 3		Dataset 4	
	$\Delta\chi^2$	$2\ln\mathcal{B}$	$\Delta\chi^2$	$2\ln\mathcal{B}$	$\Delta\chi^2$	$2\ln\mathcal{B}$	$\Delta\chi^2$	$2\ln\mathcal{B}$
I	3.7	4.8	0.8	−3.9	20.5	19.3	−22.0	−23.5
II	2.6	2.5	−0.6	−6.3	14.7	15.7	−82.3	−84.5
III	2.5	2.5	0.5	−2.9	18.8	17.1	−162.8	−162.0
IV	0.1	2.3	−0.6	−2.8	25.6	27.3	−39.6	−38.7

Referee questionou o motivo do $\Delta\chi^2 < 0$ sendo que o modelo era para ser melhor que o ΛCDM.

O problema então está no dataset 4 em todos os modelos e no dataset 2 para os modelos 2 e 4

As cadeias foram re-rodadas algumas vezes com priors diferentes e os resultados mais atuais são:

- Prior de ordem de grandeza de 1e-7;
- $\Delta\chi^2$ do dataset 2 estão melhores
- Para o dataset 4, os $\Delta\chi^2$ ainda não estão > 0 mas estão melhorando

2024 RUN	2024 RUN	2024 RUN	2024 RUN	2024 RUN	2024 RUN	2024 RUN	2024 RUN	2024 RUN	2024 RUN	2024 RUN
DATA	LCDM X2	LCDM EVIDENCE	MODEL 1 X2	MODEL 1 EVIDENCE	MODEL 2 X2	MODEL 2 EVIDENCE	MODEL 3 X2	MODEL 3 EVIDENCE	MODEL 4 X2	MODEL 4 EVIDENCE
SET 2	1020.095	-568.9967453	XXX	XXX	1019.8334	-565.5549839	XXX	XXX	1020.0218	-568.2678222
SET 4	2681.21	-1397.470085	2692.916	-1401.740917	2683.538	-1400.696365	2687.878	-1403.76161	2683.3	-1402.169926
		DATA	MODEL 1 ΔX2	MODEL 1 2 ln B	MODEL 2 ΔX2	MODEL 2 2 ln B	MODEL 3 ΔX2	MODEL 3 2 ln B	MODEL 4 ΔX2	MODEL 4 2 ln B
SET 2	CMB, BAO, SNIA, RSD	SET 2	XXX	XXX	0.2616	0.005269897	XXX	XXX	0.0732	0.001113434
SET 4	CMB, BAO, SNIA, H0,RSD	SET 4	-11.706	-0.002650461	-2.328	-0.002002963	-6.668	-0.003901682	-2.09	-0.002916256

2024 RUN	2023 RUN	2023 RUN	2023 RUN	2023 RUN	2023 RUN	2023 RUN	2023 RUN	2023 RUN	2023 RUN	2023 RUN
			MODEL 1 X2	MODEL 1 EVIDENCE	MODEL 2 X2	MODEL 2 EVIDENCE	MODEL 3 X2	MODEL 3 EVIDENCE	MODEL 4 X2	MODEL 4 EVIDENCE
			XXX	XXX	1020.736	-572.1561494	XXX	XXX	1020.73	-570.398212
			2703.198	-1409.205466	2763.482	-1439.69711	2844.05	-1478.475986	2720.806	-1416.801234
		DATA	MODEL 1 ΔX2	MODEL 1 2 ln B	MODEL 2 ΔX2	MODEL 2 2 ln B	MODEL 3 ΔX2	MODEL 3 2 ln B	MODEL 4 ΔX2	MODEL 4 2 ln B
		SET 2	XXX	XXX	-0.641	-0.004809576	XXX	XXX	-0.635	-0.002136747
		SET 4	-21.988	-0.007263598	-82.272	-0.025857226	-162.84	-0.04894351	-39.596	-0.011932813

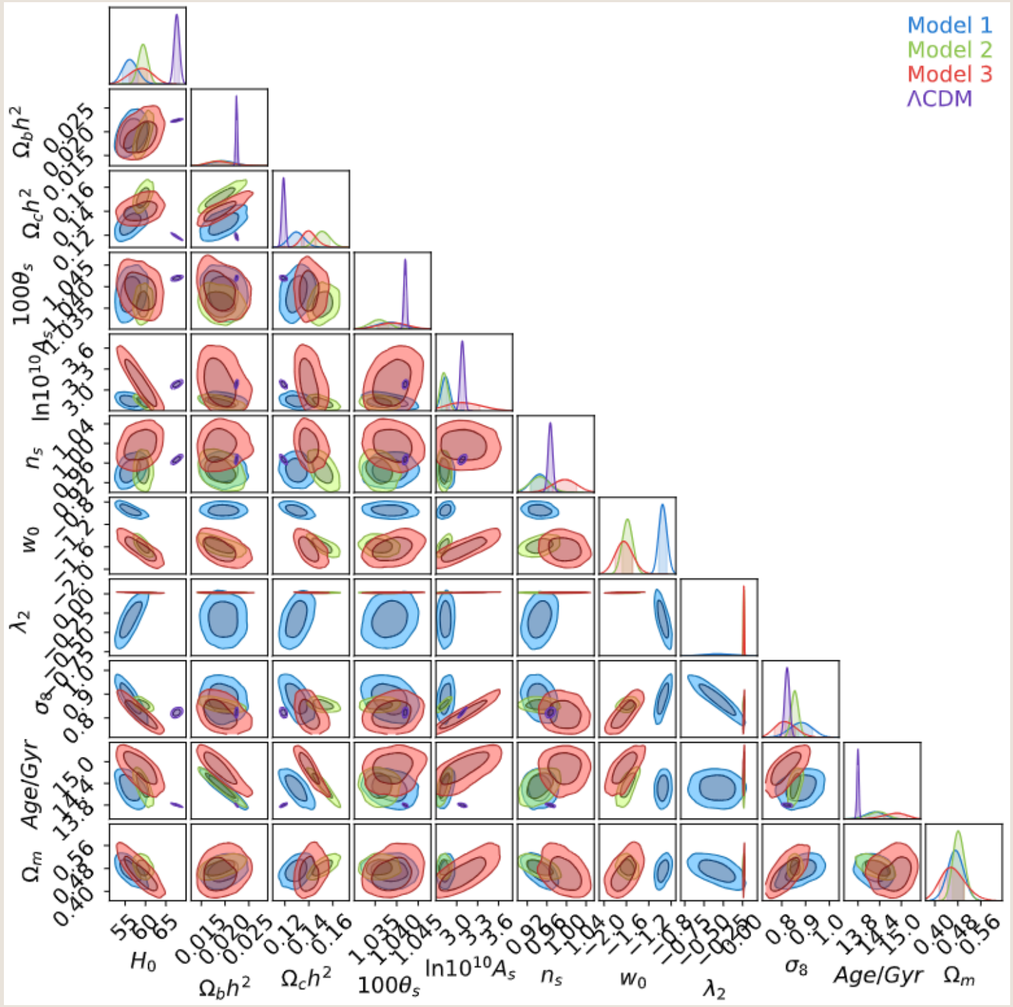
02

Forecast

FAPESP

Timeline

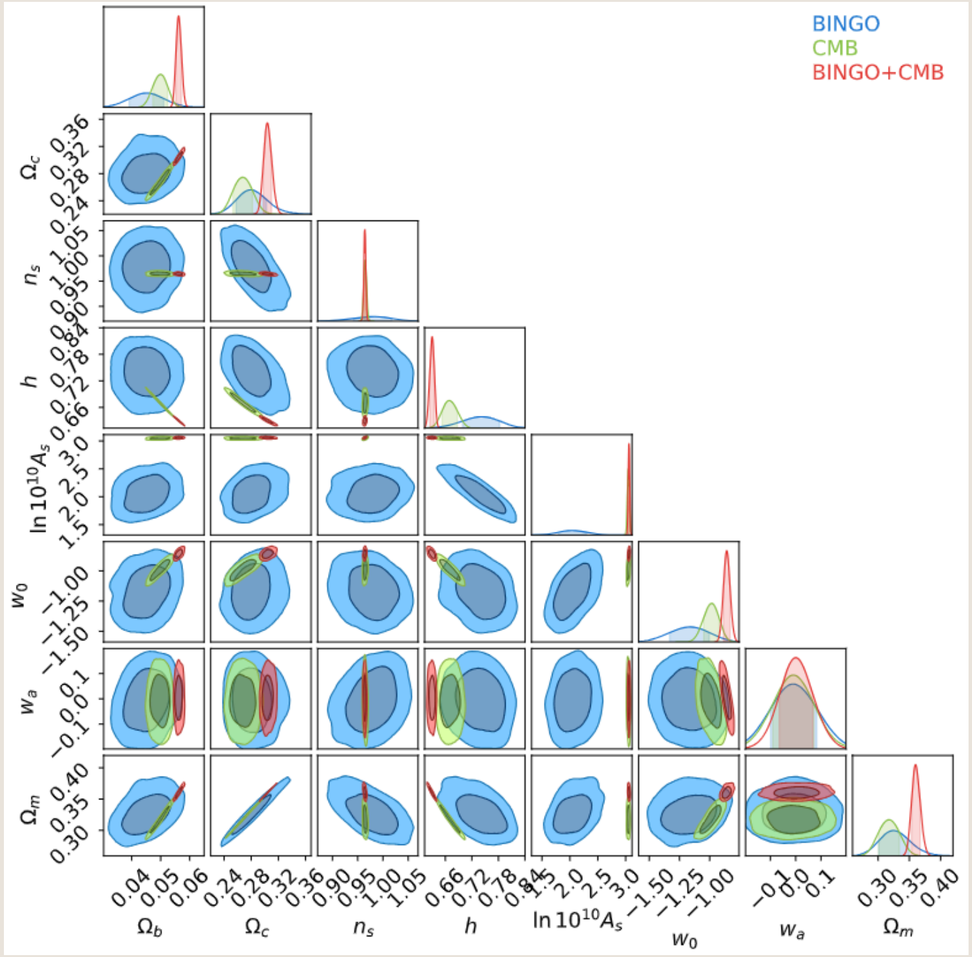
Nov/2023	Comecei meu projeto da FAPESP rodando os 3 modelos com dados do BINGO
Maio/2024	Relatório parcial, tinha as rodadas dos 3 modelos com BINGO
Set/2024	Renovação de bolsa, tinha as rodadas dos 3 modelos BINGO + testes de compatibilidade
Nov/2024	Apresentei no SIICUSP os resultados do projeto - slide
Mar/2025	Apresentar no SIICUSP os resultados do projeto - poster
Jun/2025	Relatório final: ter as rodadas dos 3 modelos com BINGO + CMB + BAO



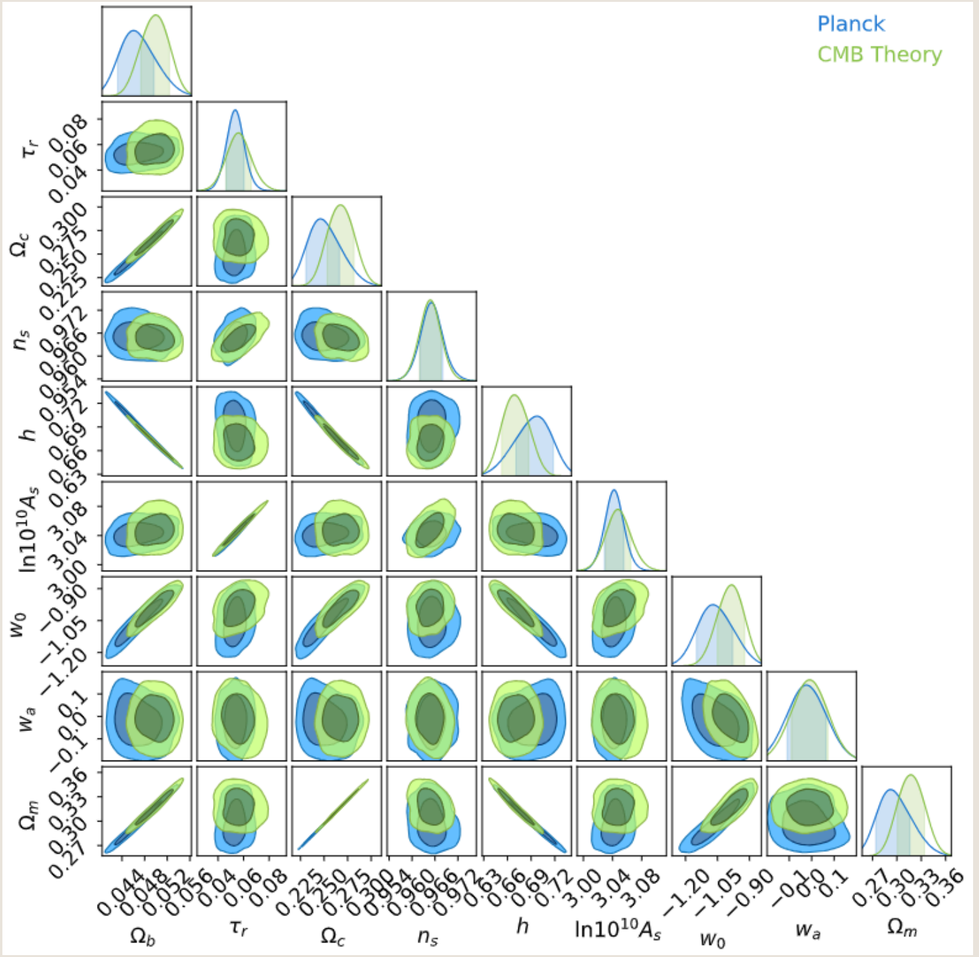
BINGO

Parâmetro	ΛCDM	Modelo 1	Modelo 2	Modelo 3
$\Omega_b h^2$	0.0224 ± 0.0002	$0.0196^{+0.0024}_{-0.0023}$	$0.0187^{+0.0025}_{-0.0023}$	$0.0185^{+0.0028}_{-0.0024}$
$\Omega_c h^2$	$0.1189^{+0.0014}_{-0.0015}$	$0.1294^{+0.0067}_{-0.0064}$	$0.1510^{+0.0066}_{-0.0060}$	$0.1396^{+0.0065}_{-0.0060}$
$100\theta_s$	1.0420 ± 0.0003	$1.0384^{+0.0030}_{-0.0031}$	1.0359 ± 0.0022	$1.0392^{+0.0033}_{-0.0035}$
$\ln 10^{10} A_s$	3.080 ± 0.029	$2.838^{+0.061}_{-0.059}$	$2.814^{+0.055}_{-0.051}$	$3.07^{+0.26}_{-0.23}$
n_s	0.967 ± 0.005	$0.945^{+0.017}_{-0.018}$	0.946 ± 0.020	$0.997^{+0.24}_{-0.25}$
w_0	-	$-0.953^{+0.075}_{-0.071}$	$-1.58^{+0.09}_{-0.10}$	-1.65 ± 0.16
$\lambda_{(1,2)}$	-	-0.33 ± 0.18	$0.0156^{+0.0050}_{-0.0049}$	$0.0161^{+0.0047}_{-0.0045}$
H_0	67.7 ± 0.7	$56.1^{+1.9}_{-1.8}$	$59.4^{+1.1}_{-1.2}$	$59.1^{+2.6}_{-3.1}$
σ_8	$0.822^{+0.11}_{-0.10}$	$0.883^{+0.045}_{-0.049}$	$0.854^{+0.016}_{-0.015}$	$0.810^{+0.047}_{-0.041}$
Age/Gyr	13.80 ± 0.03	$14.28^{+0.25}_{-0.27}$	$14.37^{+0.24}_{-0.27}$	$14.87^{+0.29}_{-0.35}$
Ω_m	-	$0.471^{+0.029}_{-0.027}$	$0.482^{+0.021}_{-0.020}$	$0.455^{+0.047}_{-0.40}$

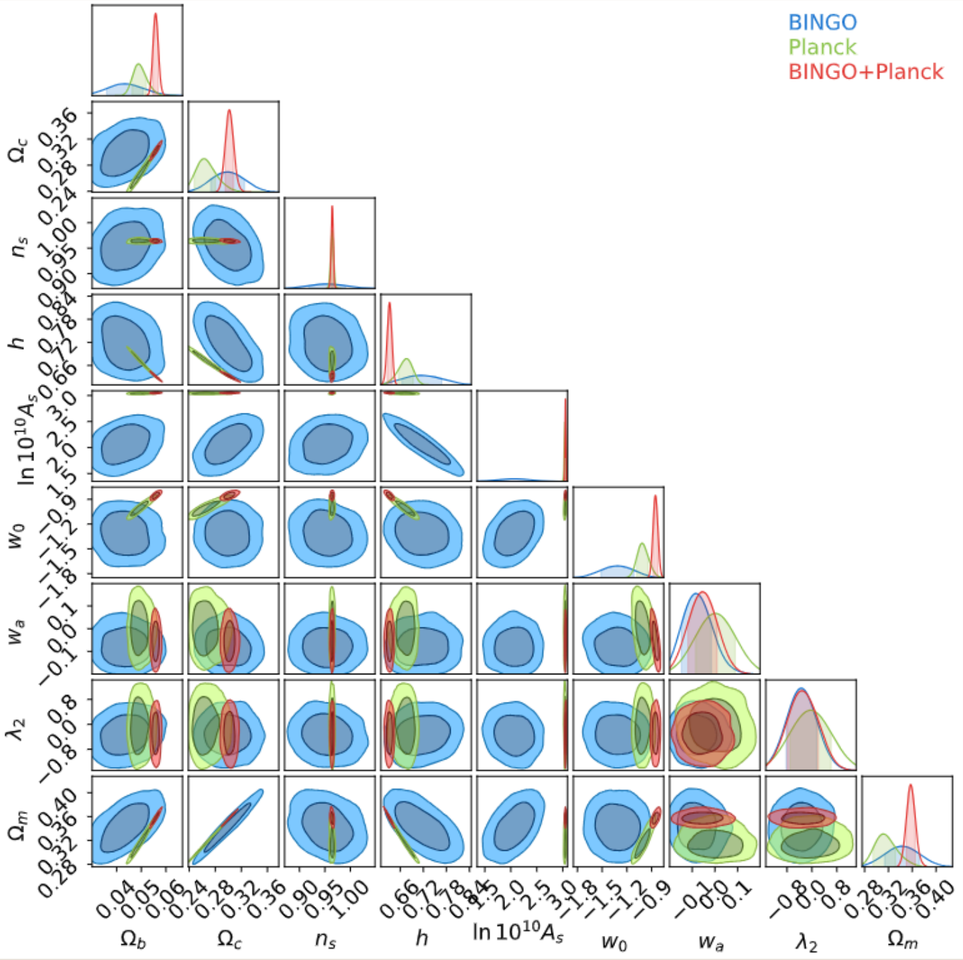
Compatibilidade entre simulações: BINGO + CMB



Compatibilidade entre simulação e dado: CMB + Planck



Compatibilidade entre simulação e dado: BINGO + Planck



Parâmetro	Teórico	CMB - Planck	BINGO	CMB + BINGO
Ω_b	0.0493	$0.0460^{+0.0036}_{-0.0028}$	$0.0473^{+0.0080}_{-0.0076}$	0.0558 ± 0.0011
Ω_c	0.2645	$0.246^{+0.020}_{-0.016}$	$0.292^{+0.031}_{-0.030}$	$0.302^{+0.007}_{-0.006}$
τ_r	0.0544	$0.0534^{+0.0071}_{-0.0070}$	-	$0.0574^{+0.0047}_{-0.0046}$
n_s	0.9649	$0.9650^{+0.0030}_{-0.0029}$	$0.958^{+0.0038}_{-0.0042}$	0.9643 ± 0.0020
h	0.6736	$0.697^{+0.021}_{-0.027}$	$0.740^{+0.048}_{-0.050}$	0.632 ± 0.006
$\ln 10^{10} A_s$	3.044	$3.042^{+0.014}_{-0.013}$	$1.99^{+0.027}_{-0.024}$	3.051 ± 0.009
w_0	-1.0	$-1.07^{+0.09}_{-0.08}$	$-1.31^{+0.02}_{-0.01}$	-0.85 ± 0.03
w_a	0.0	$-0.024^{+0.087}_{-0.085}$	$-0.036^{+0.086}_{-0.084}$	$-0.054^{+0.063}_{-0.065}$
Ω_m	-	$0.292^{+0.024}_{-0.018}$	$0.336^{+0.037}_{-0.034}$	0.358 ± 0.008

Próximos Passos:

- Combinar as simulações de dados do BINGO com dados de BAO do Sloan Digital Sky Survey (SDSS e SDSS-III) e 6dF Galaxy Survey (6dFGS) e CMB do Planck para os 3 modelos de interação;

- Repetir a comparação com o modelo ΛCDM para analisar a viabilidade dos modelos propostos.

03

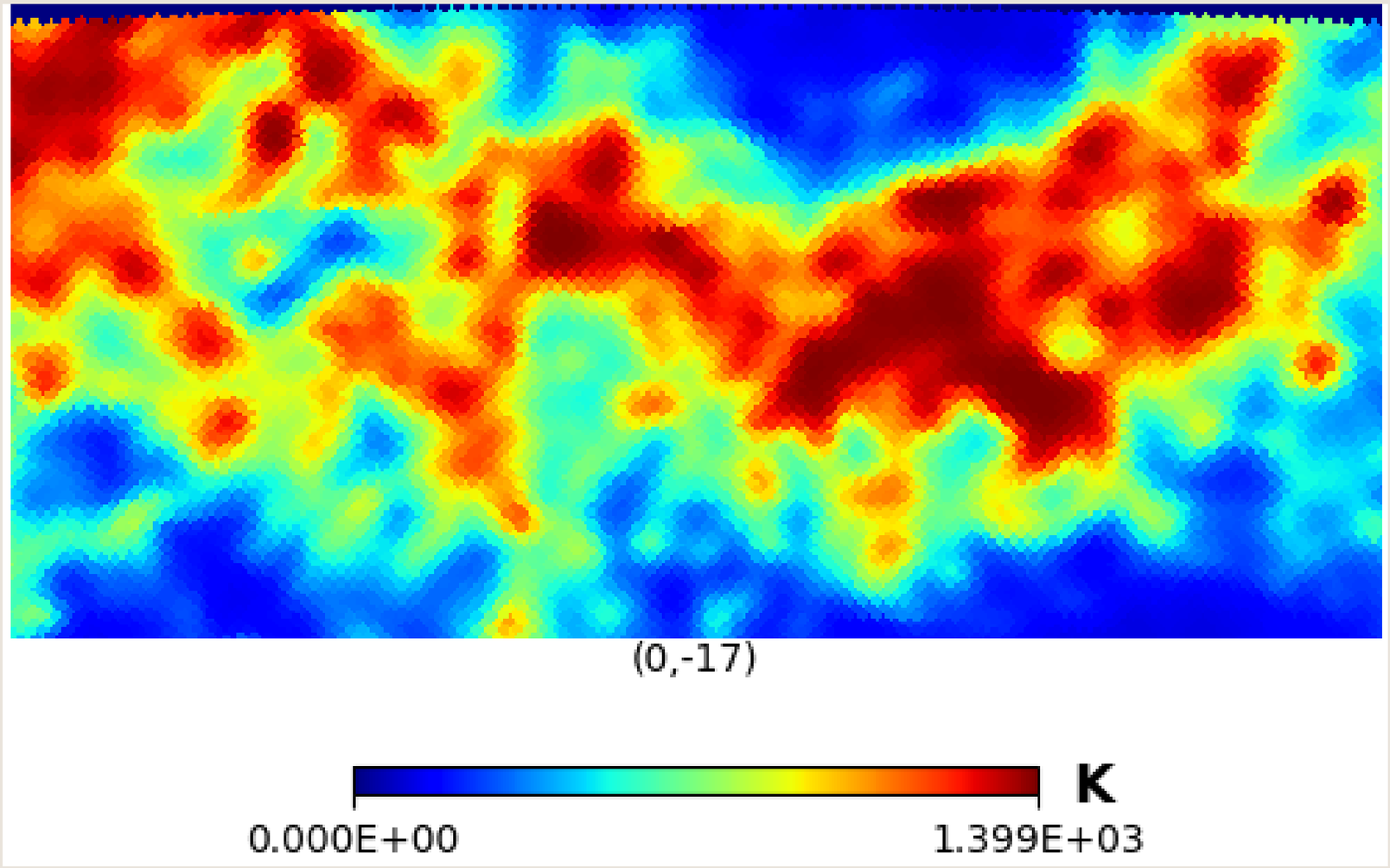
Rádio

1/f

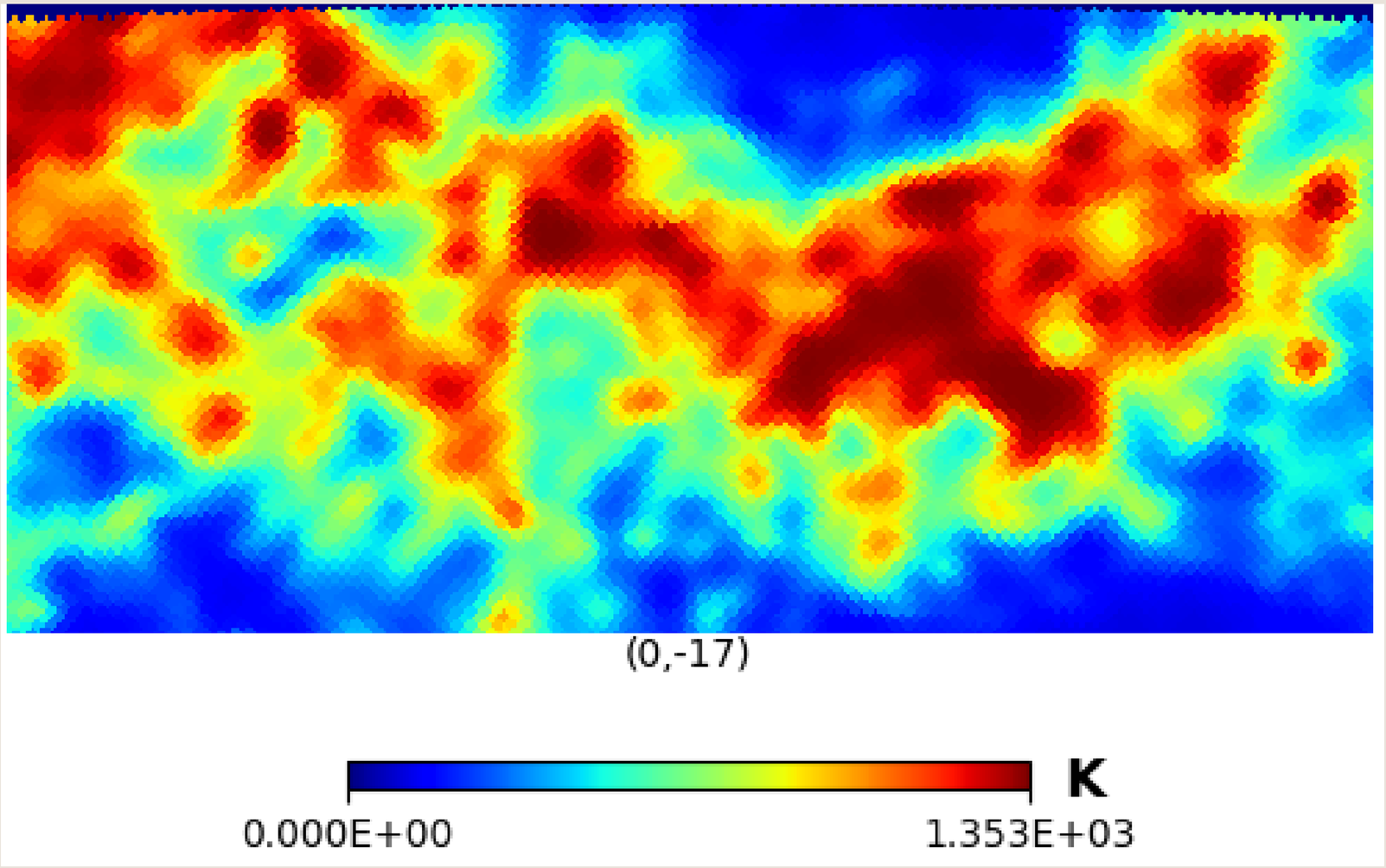
Timeline

Jul/2024	Projeto feito em 1 mês na China
Jul/2024	Apresentei no evento da USTC os resultados do projeto - poster
?/2025	Rodar com novas configurações do 1/f

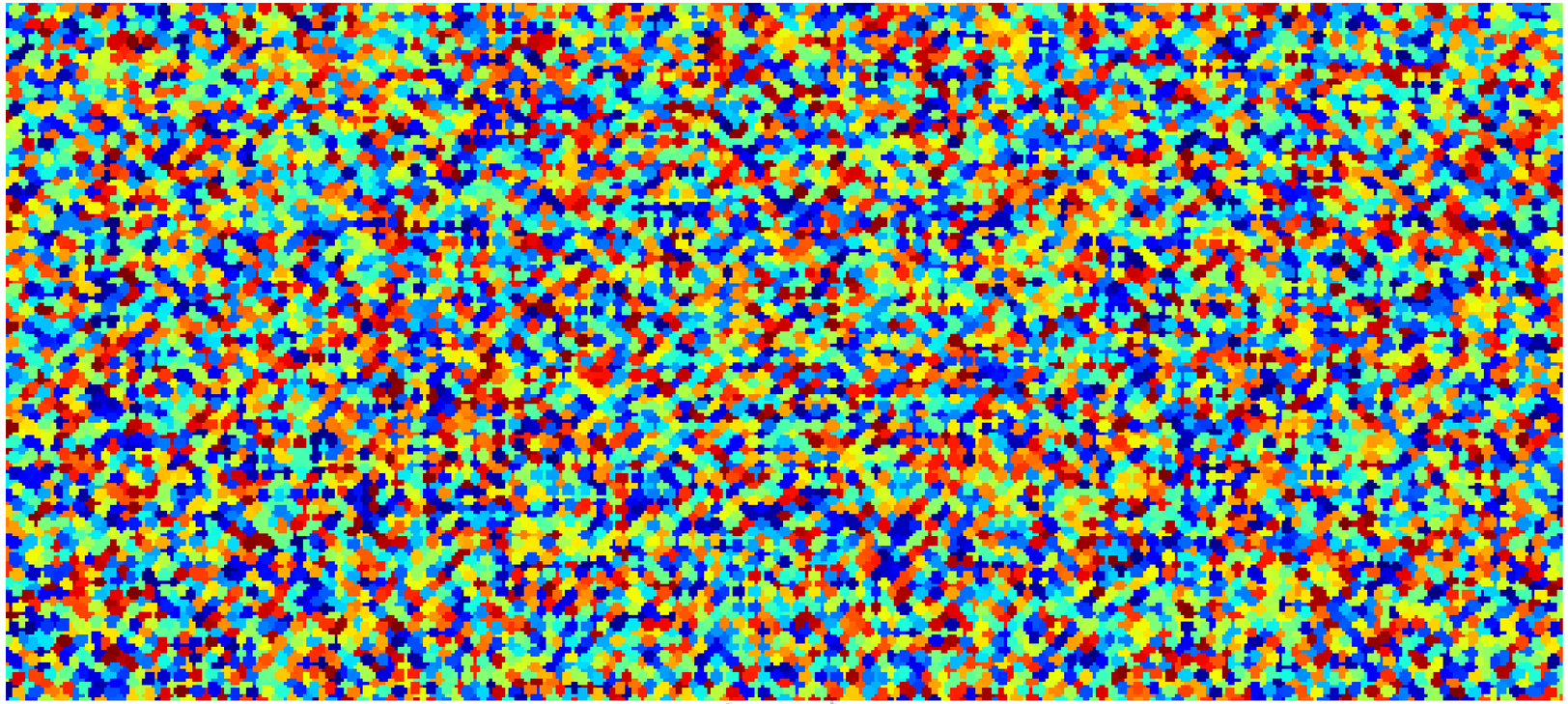
naivemap - sem 1/f



naivemap - com 1/f



naivemap - diferença



Próximos Passos:

- Rodar com novas configurações do 1/f;
- Adicionar outros ruídos nas simulações.

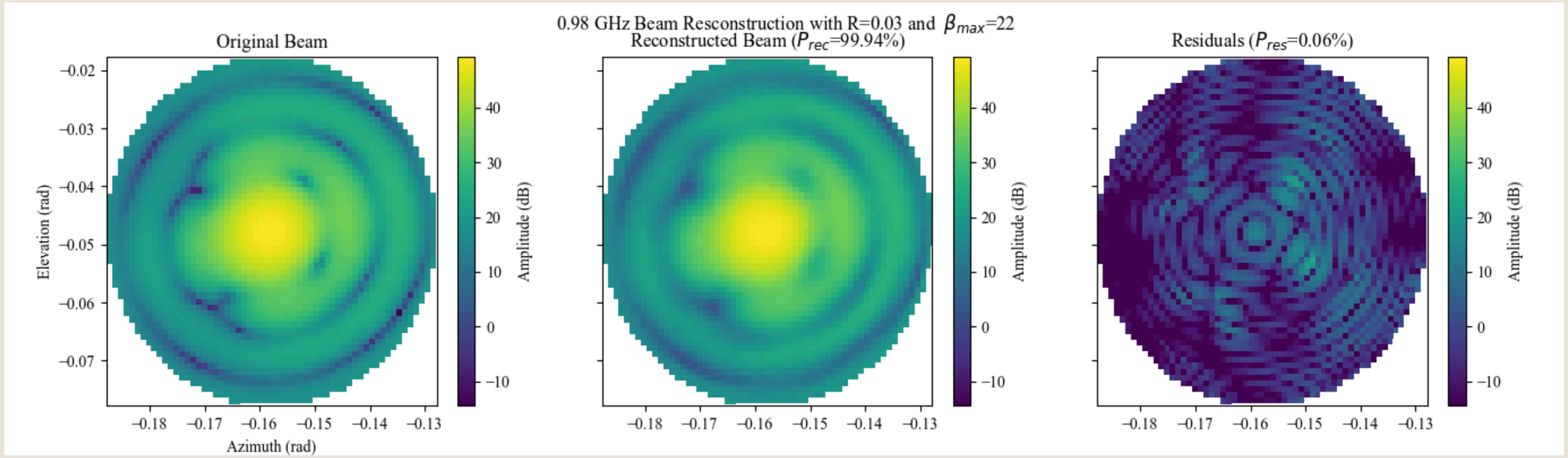
04

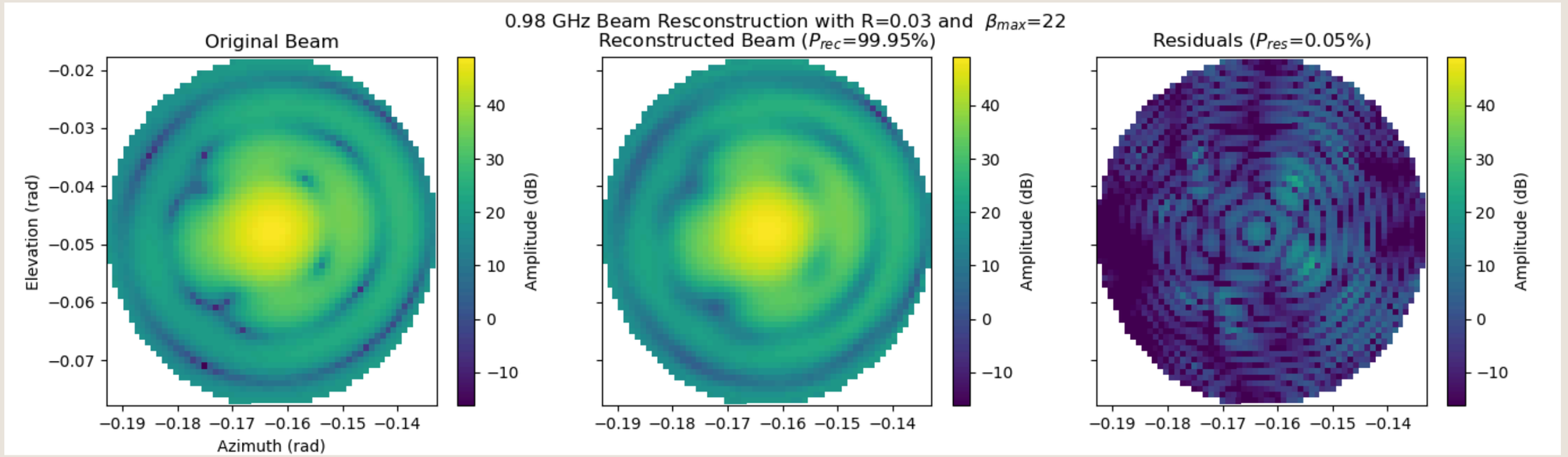
Rádio

Paper: Feixe

Timeline

Nov/2024	Reunião com Alex e Filipe sobre o paper “Analysis of Simulated Beam Patterns”
Dez/2024	Reprodução das imagens antigas do paper com arranjo “básico” do BINGO
Jan/2025	Rodar GRASP Full para fazer imagens com arranjo melhor do BINGO


0.98 GHz Beam Resconstruction with R=0.03 and β_{max}=22
Original Beam
Reconstructed Beam (P_{rec}=99.94%)
Residuals (P_{res}=0.06%)
Elevation (rad)
Azimuth (rad)
Amplitude (dB)


0.98 GHz Beam Resconstruction with R=0.03 and β_{max}=22
Original Beam
Reconstructed Beam (P_{rec}=99.95%)
Residuals (P_{res}=0.05%)
Elevation (rad)
Azimuth (rad)
Amplitude (dB)

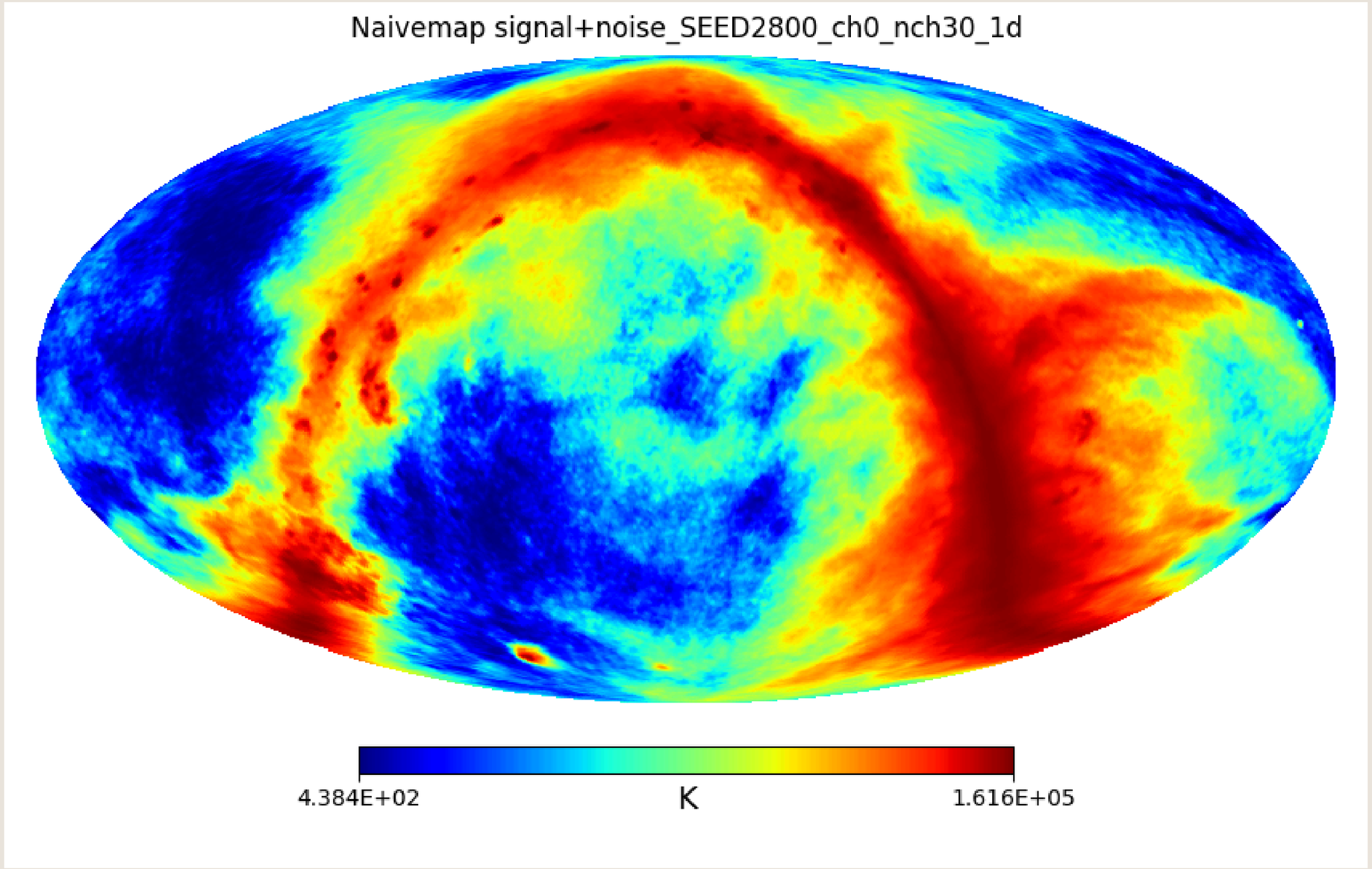
Próximos Passos:

- Rodar GRASP Full com novo arranjo do BINGO para continuar o paper
- Nova reunião com o Filipe e Alex para darmos continuidade e termos acesso ao GRASP Full

HIDE/Alessandro

Update:

- Criação de um .ini para o HIDE;
- Rodadas do HIDE para o céu inteiro;
- Rodadas do HIDE com arquivos diferentes de input para a faixa do BINGO.


Naivemap signal+noise_SEED2800_ch0_nch30_1d
4.384E+02
K
1.616E+05

Obrigada!

Luiza Olivieri Ponte