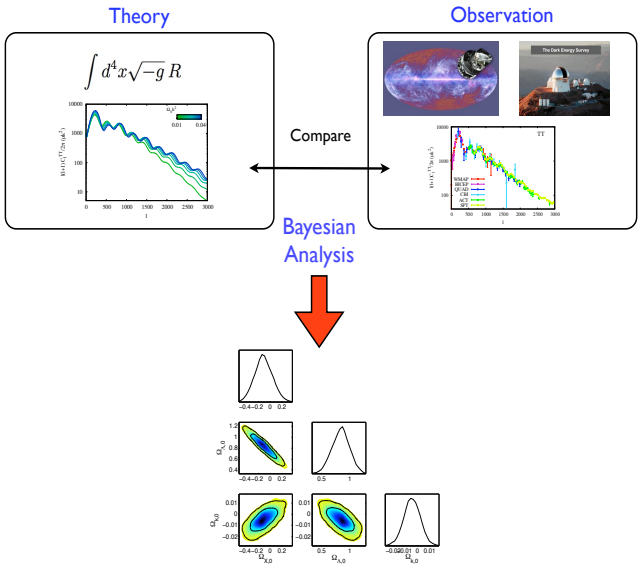
Updated Cosmology

with Python



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In progress

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Homework 12

1.- HW: check that

$$g_{\mu\nu}(E_i)^\mu(E_j)^\nu = -\delta_{ij}.$$

2.- Compute

$$T^{0i} = a^{-2}(q^i + \bar{P}B^i).$$

$$T^{ij} = a^{-2}[\bar{P}\delta^{ij} + (2\bar{P}\phi + \delta P)\delta^{ij} - 2\bar{P}E^{ij} - \Pi^{ij}].$$

$$T^0_0 = \bar{\rho}(1+\delta).$$

$$T^i_j = -(\bar{P} + \delta P)\delta^i_j + \Pi^i_j.$$

3.- Show that the quantities transform like

$$\begin{aligned}
\tilde{\phi} &= \phi + \mathcal{H}T + \frac{1}{3}\partial_i L^i. \\
\tilde{B}_i &= B_i + \partial_i T - L'_i. \\
\tilde{E}_{ij} &= E_{ij} - \partial_{<i}L_{j>}.
\end{aligned}$$

4.- Show that Φ, Ψ, Φ_i don't change under a coordinate transformation

5.- Show that the following quantities transform like

$$\begin{aligned}
\delta\tilde{P} &= \delta P - T\dot{\bar{P}}. \\
\tilde{q}^i &= q^i + (\bar{\rho} + \bar{P})\dot{L}^i. \\
\tilde{\Pi}^i_j &= \Pi^i_j.
\end{aligned}$$

6.- Show that Δ is gauge-invariant