

Cosmology with LIGO/Virgo dark sirens and galaxy catalogs

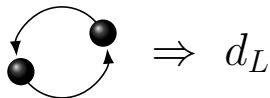
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Based on [2101.12660](#), in collaboration with: Andreas Finke, Stefano Foffa,
Michele Maggiore, Michele Mancarella



University of Geneva (UNIGE)

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GWs and Cosmology: general idea



Complementary
information on z

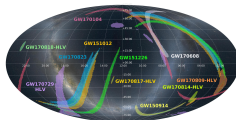

$$d_L^{\text{gw}}(z) = \underbrace{\left[\Xi_0 + \frac{1 - \Xi_0}{(1+z)^n} \right]}_{\text{Modified GW propagation}} \underbrace{\frac{c(1+z)}{H_0} \int_0^z \frac{dz'}{E(z')}}_{\text{Standard } d_L^{\text{em}}(z)}$$

Cosmology & Modified Gravity



Methodology: hierarchical Bayesian framework

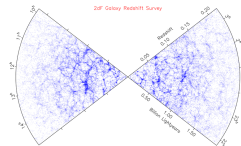
$$\lambda' = \text{H}_0 \text{ or } \Xi_0$$



LVC skymaps

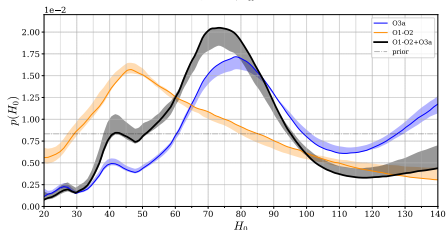
$$p(\lambda'|\{\mathcal{D}_{\text{GW}}\}) \propto \prod_{i=1}^{N_{\text{det}}} \frac{1}{\beta(\lambda')} \int d\theta \, p(\mathcal{D}_{\text{GW}}^i|\theta, \lambda') p_0(\theta|\lambda')$$

Detection model,
MC computation

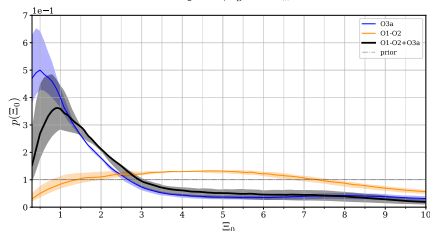


Galaxy catalogue: completeness and completion

Results: estimation of H_0 and Ξ_0

K-band weights, $L/L_K^* > 0.6$, $P_{th} = 0.5$ 

$$\Rightarrow H_0 = 75^{+25}_{-22} \text{ km s}^{-1} \text{ Mpc}^{-1}$$

B-band weights, $L/L_B^* > 0.6$, $P_{th} = 0.2$ 

$$\Rightarrow \Xi_0 = 1.88^{+3.83}_{-1.10}$$

Thanks for your attention

For any question or comment, contact me at
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or through Mattermost