

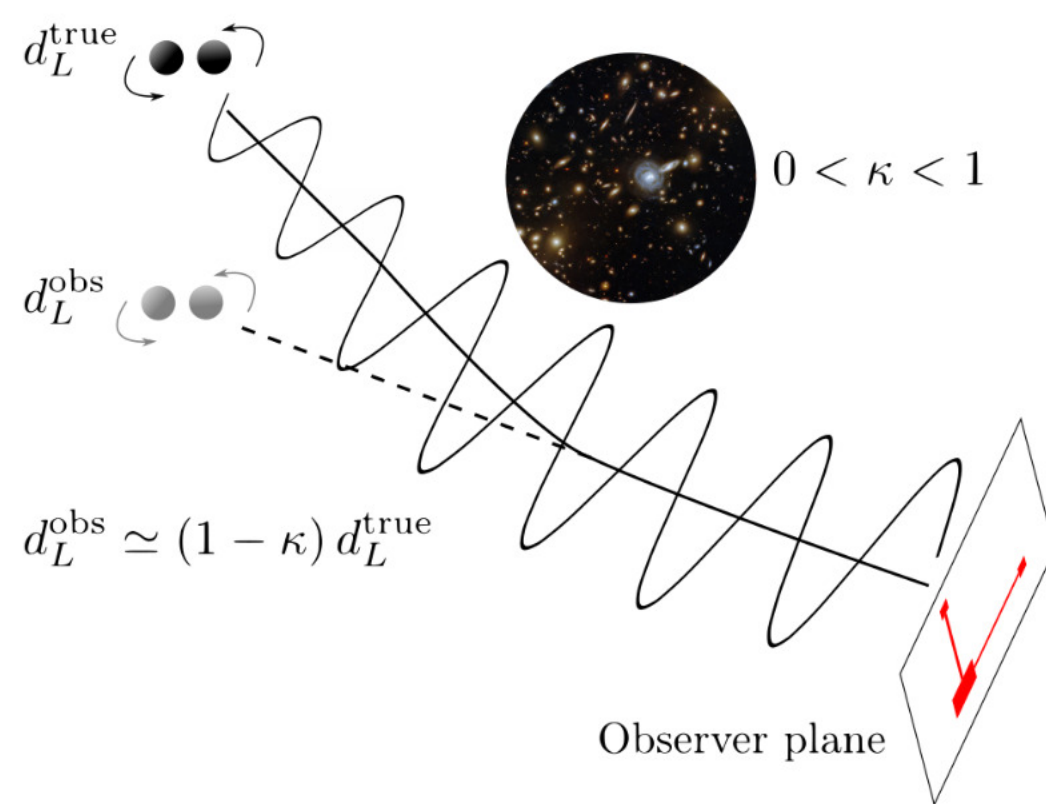
# Cosmology from the weak lensing of gravitational waves

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and Andy Taylor

Based on work in 2208.05959.  
Submitted to Phys. Rev. D



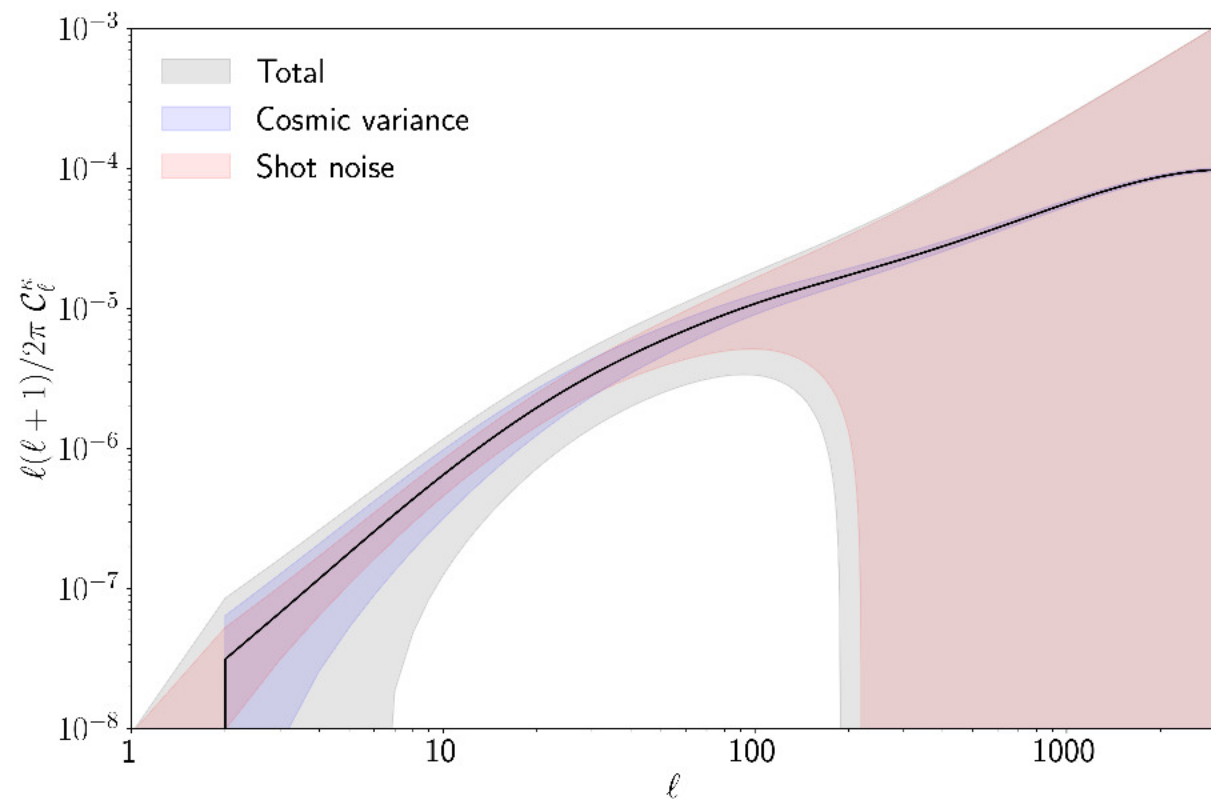
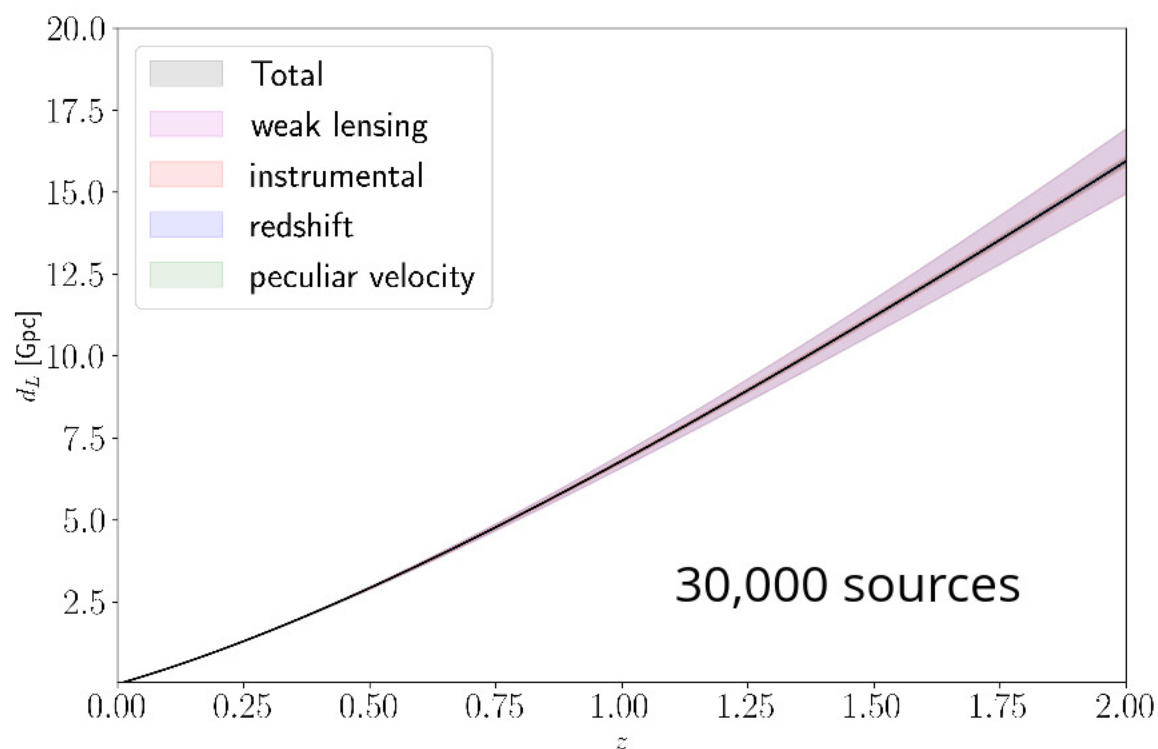
THE UNIVERSITY of EDINBURGH  
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& Astronomy



# Joint standard siren + weak lensing analysis

Scatter around best fit  $d_L$  -  $z$  probes  
convergence field

Weak lensing analysis is conditional on  
standard siren measurement

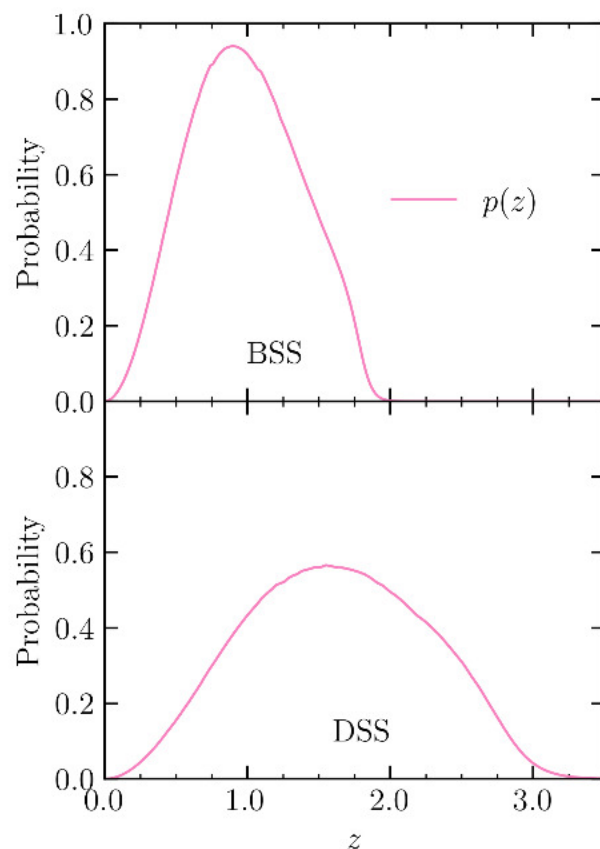


# 2040's: 3G Detectors

## Merger populations

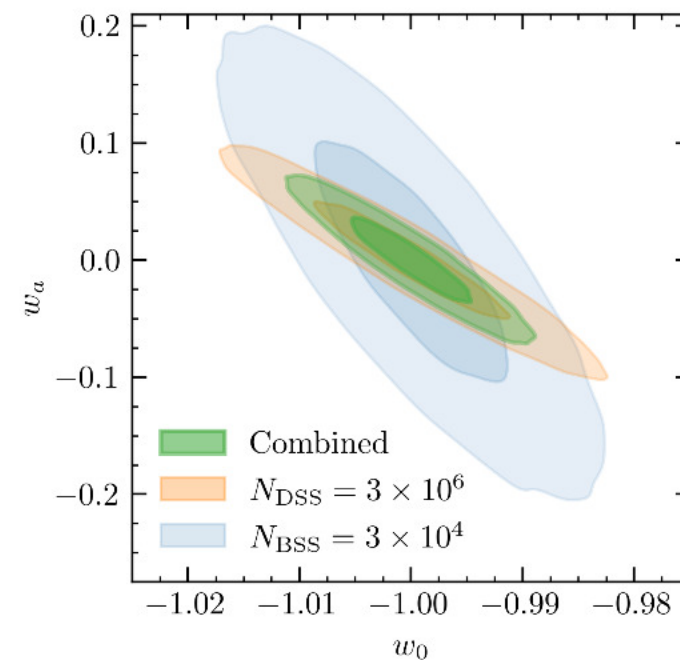
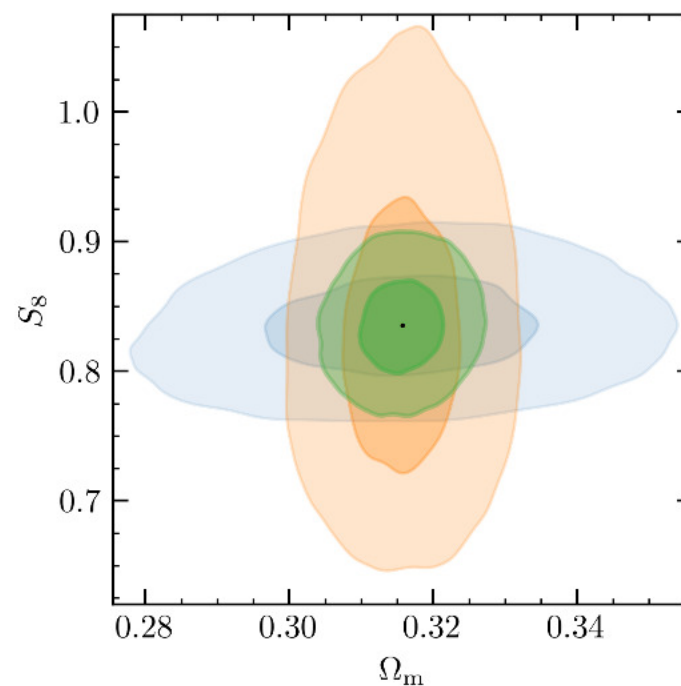
BSS - Bright Standard Siren

DSS - Dark Standard Siren



## Cosmological Constraints

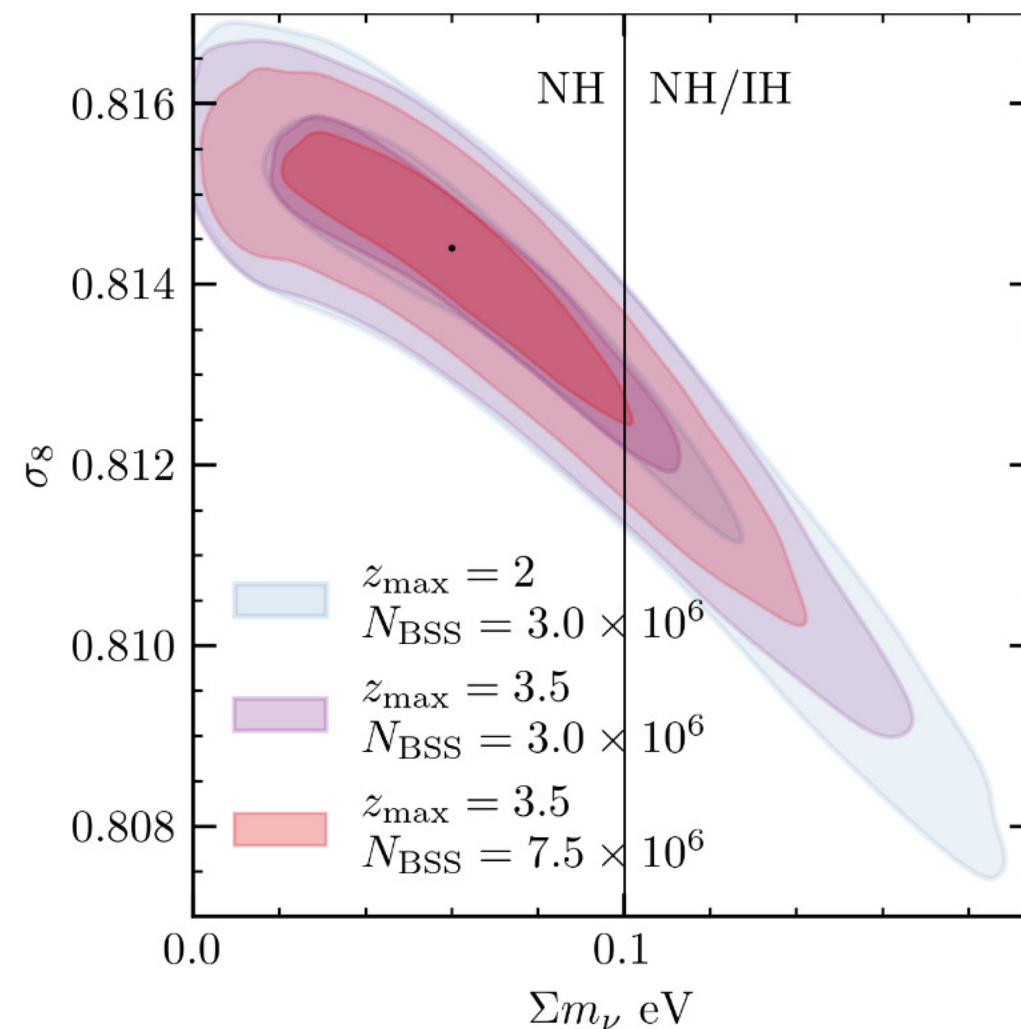
Combining BSS and DSS breaks parameter degeneracies



# 2050's: DeciHz Detectors

For DeciHz detectors, higher redshift population of well localised sources

First demonstration of how GWs from merging binaries could independently constrain neutrinos



- The weak lensing of gravitational waves is *not just a systematic* – it can be a valuable source of extra information
- Using this method, 3G detectors could outperform future galaxy surveys in constraining dark energy
- DeciHz detectors have the potential to add valuable information on the sum of neutrino masses