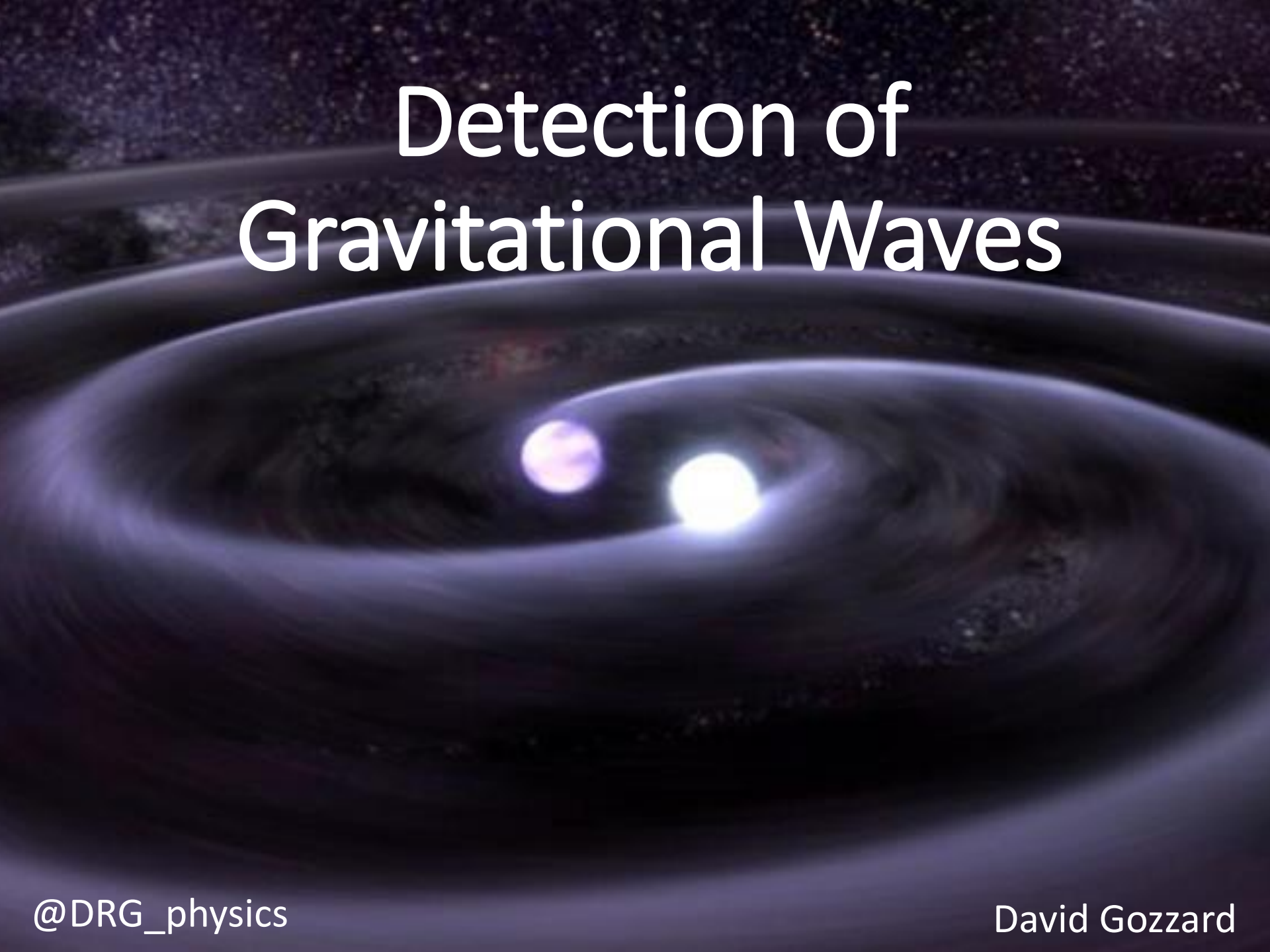
# Detection of Gravitational Waves



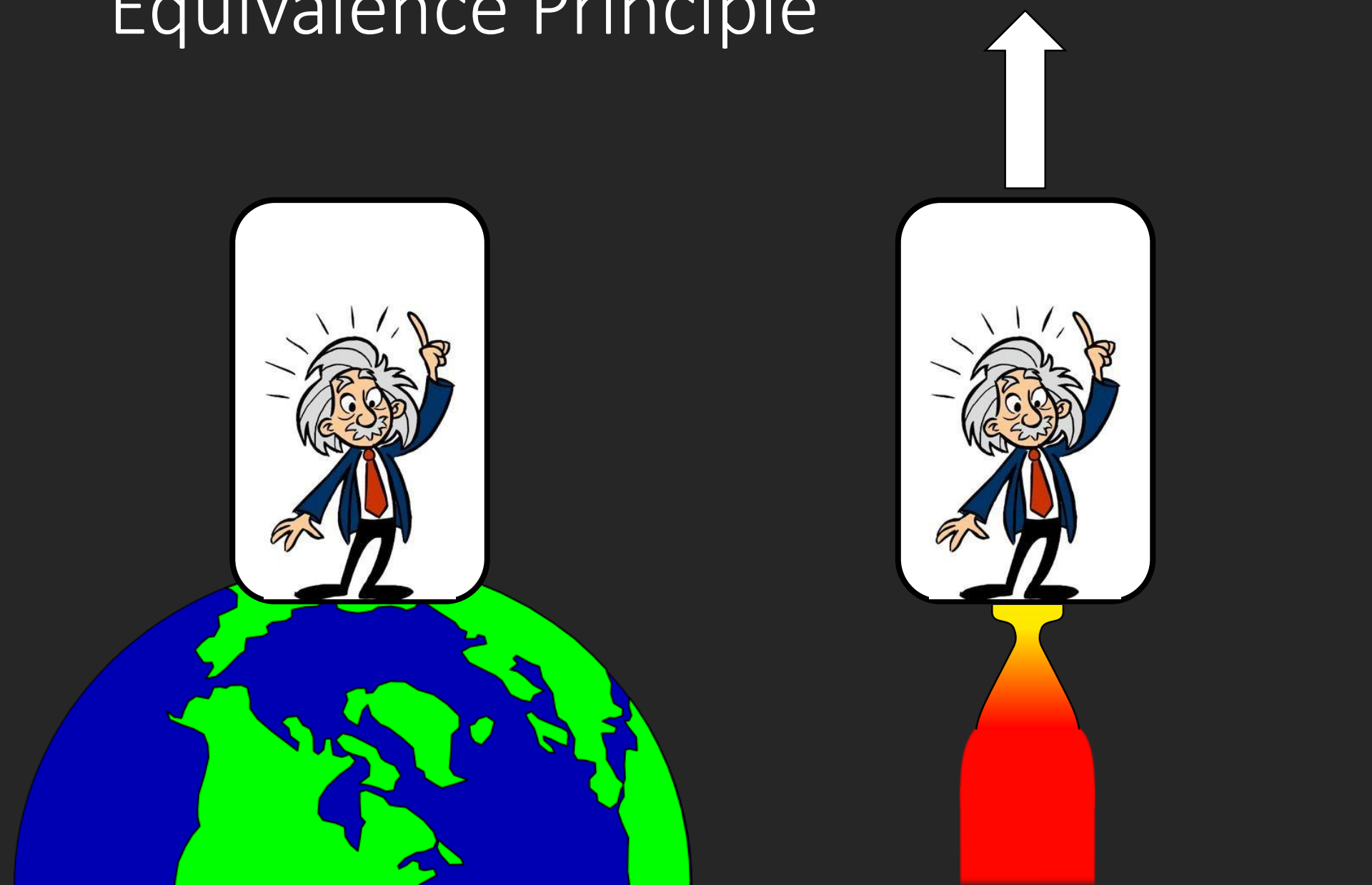
@DRG_physics

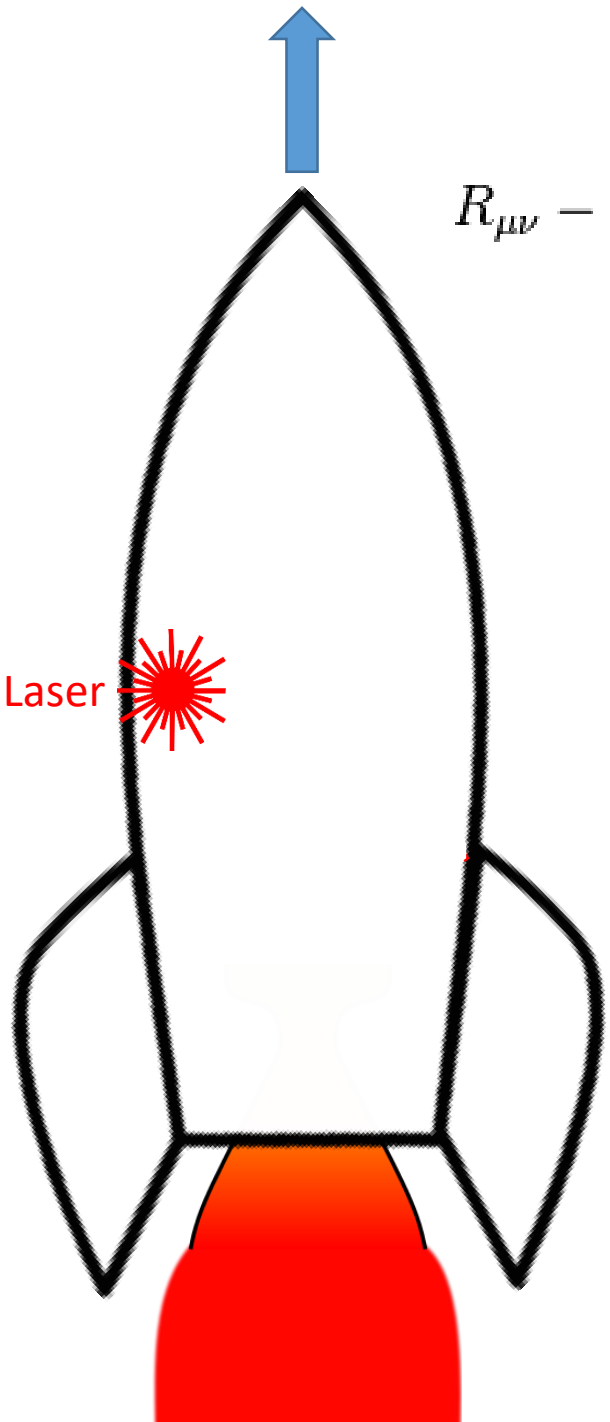
David Gozzard

# Equivalence Principle

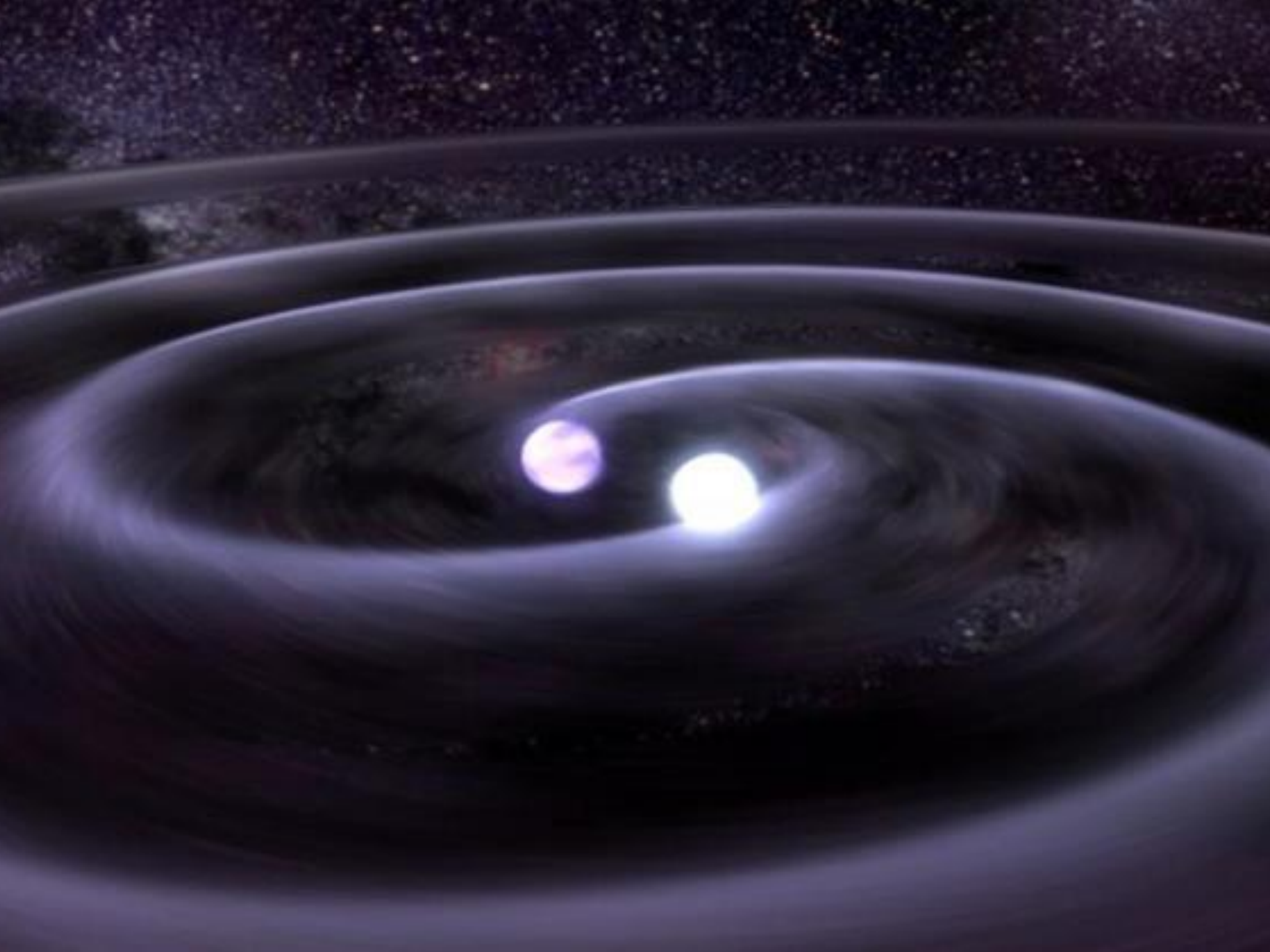
# Equivalence Principle

# Equivalence Principle

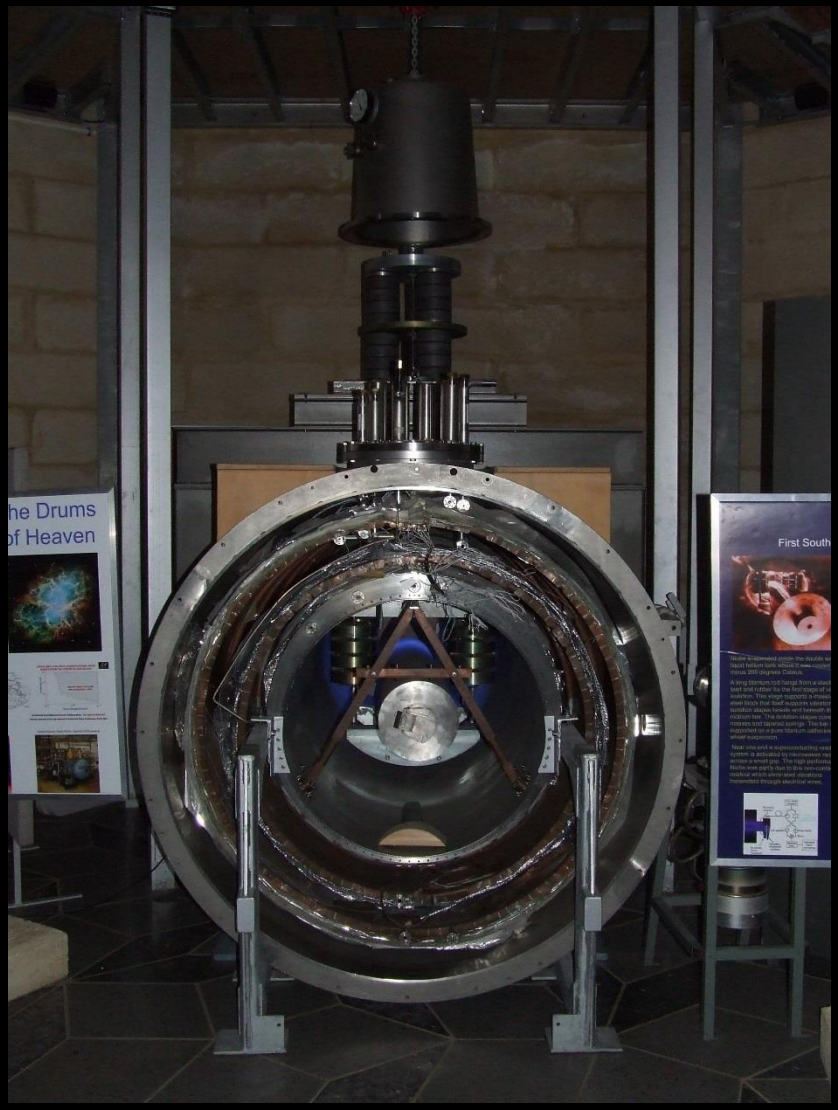




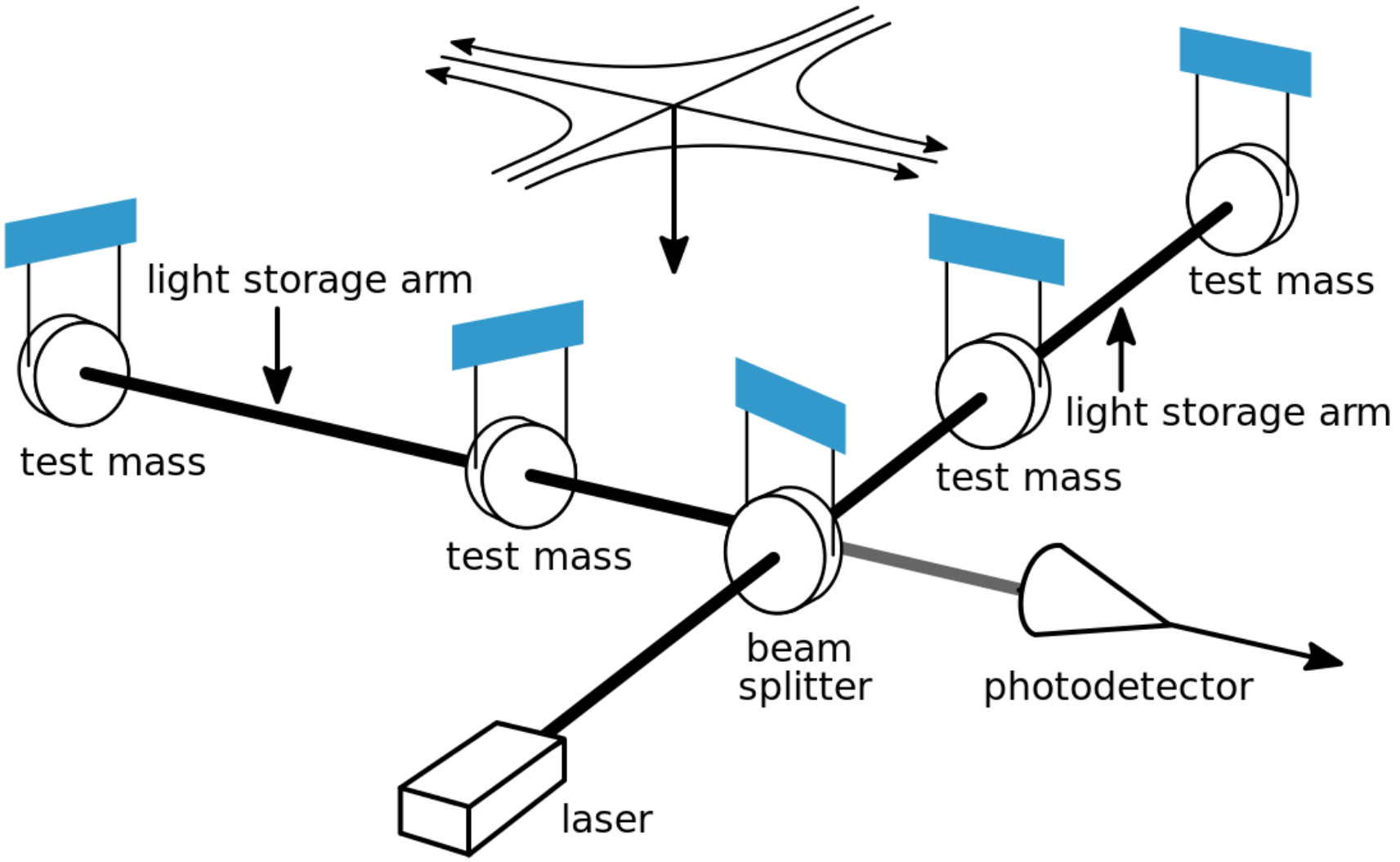

$$R_{\mu\nu} - \tfrac{1}{2}R\,g_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4}T_{\mu\nu}$$



# Detectors

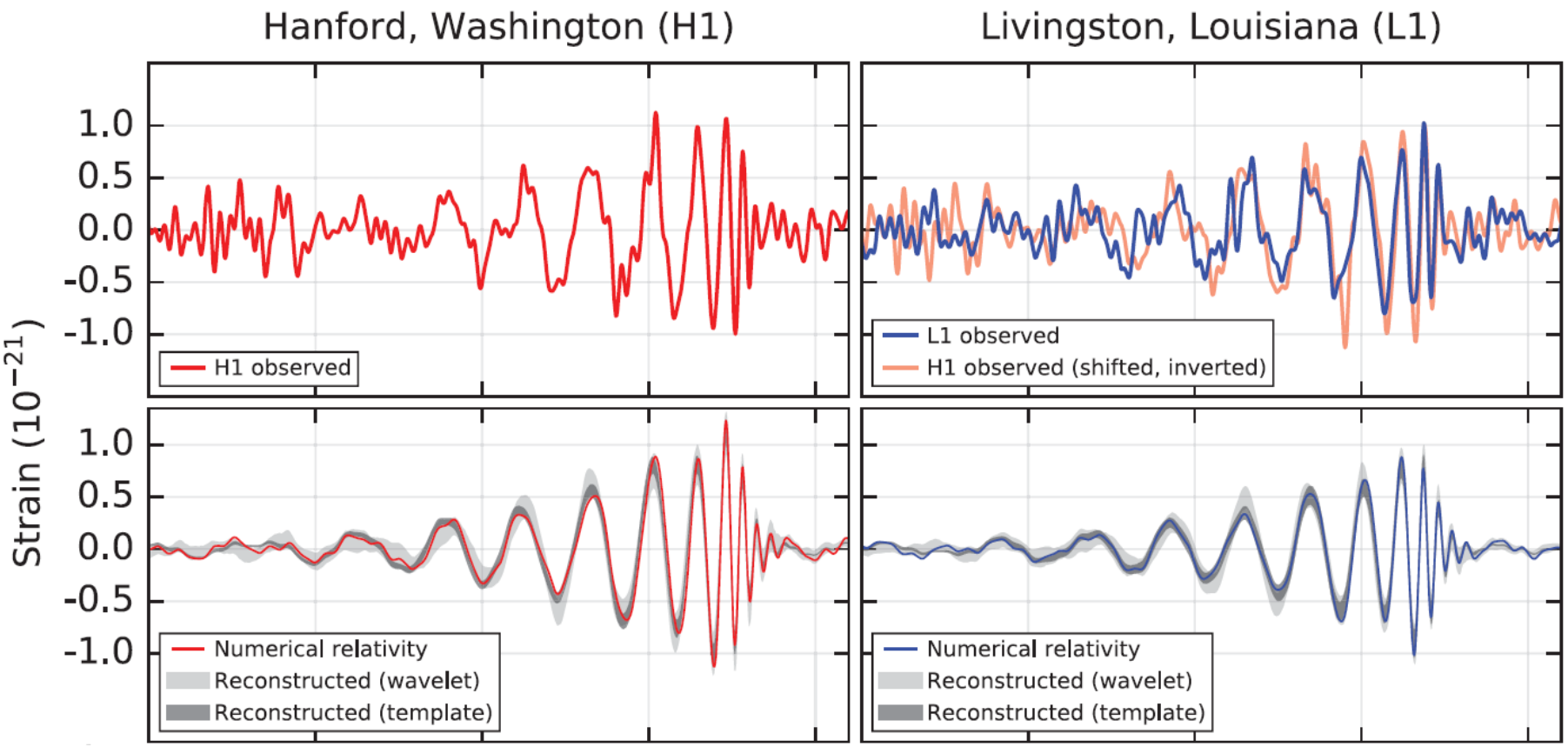


# Detectors

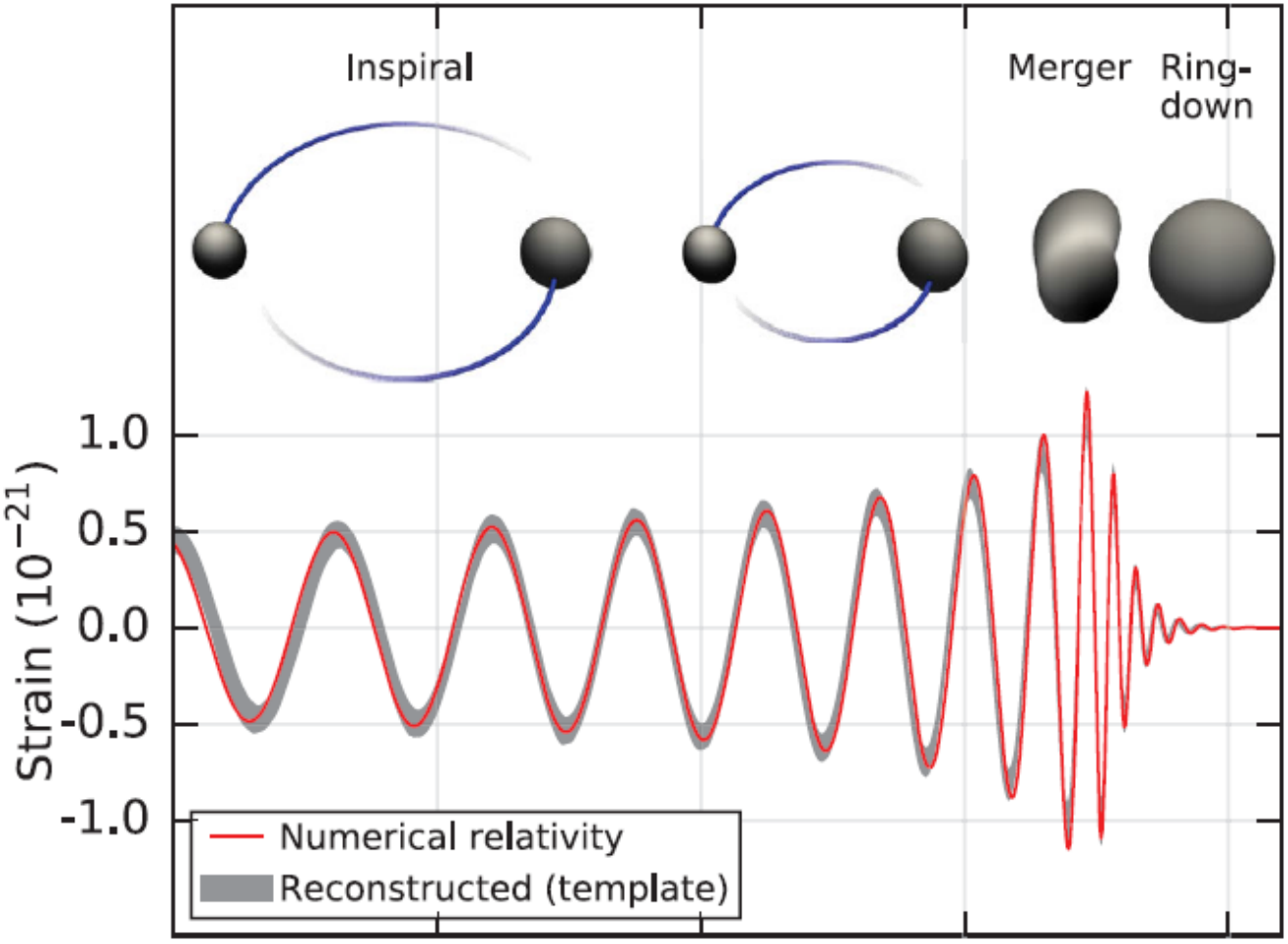

light storage arm
test mass
test mass
test mass
test mass
light storage arm
beam
splitter
photodetector
laser

# Detectors

# Detection!


Hanford, Washington (H1)
Livingston, Louisiana (L1)
Strain ($10^{-21}$)
1.0
0.5
0.0
-0.5
-1.0
H1 observed
L1 observed
H1 observed (shifted, inverted)
Numerical relativity
Reconstructed (wavelet)
Reconstructed (template)

# Detection!


Inspiral
Merger
Ring-down
1.0
0.5
0.0
-0.5
-1.0
Strain ($10^{-21}$)
Numerical relativity
Reconstructed (template)

# Detection Banana