What comes next for LIGO?

Mansi M. Kasliwal
Carnegie Institution for Science
(& soon, California Institute of Technology)
Seeing the Sound:
Bridging Gravitational Wave Physics and Electromagnetic Astronomy

Strong Field Gravity: Masses, Spins, Inclination

Energetics and beaming?
Environment
r process nuclear physics?
Ejecta mass and velocity?
Kilonovae: Blue Flash (~hours) & Red Transient (~days)

Figures from Metzger et al. 2010, 2014


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The EM-GW Challenge

1. Wide
2. Faint
3. Fast
4. Red
Scenario I: Jetted X-ray/Gamma-ray Emission

See Neil’s talk

BUT...
Only for Beamed <2.5%
Scenario II: Bright & Fast Optical Flash
Suite of Optical Surveys

Evryscope, ASASSN, HATPI  ZTF, CSS-II, PS, BG  DECAM, HSC, LSST

Telescope apertures spanning 0.1m to 8m!
Camera angles spanning 10s to 10000 sq deg!

Well-prepared for optical survey hardware.
The Early Years of Coarse GW Localizations

See also Singer et al. 2014 for Multiple Islands
EM-GW Detectability (Hardware)

EM-GW Detectable Fraction of Mergers

EM Counterpart Luminosity (Absolute i-mag)

Nickel peak r-proc peak

Kasliwal & Nissanke 2013