Cosmology and the Early Universe - PAX 2019

What problems lie on critical path?

Bernard Schutz

Identification of counterparts — GW170817 was the exception!

- Short window of time available.
- At distances > 100 Mpc it is challenging for most current telescopes.
- Reliable distances and sky maps are needed on a short timescale. (Whatever the accuracies are, identifications will require that we get them right quickly.)
- EM observers are interested in this but the time to develop better instruments is long - are we working enough with them now to know what we might need?

Detector data quality is potentially a key issue in providing reliable sky positions and distances to EM observers.

- BNS mergers last > 1 min now, much longer in 3G. This gives lots of time for glitches. GW170817 and S190510g both had data quality problems.

- Adding new 2G detectors (KAGRA, LIGO-I) will help, but excluding a glitching detector from an observation reduces SNR and all parameter accuracies. 3G may have fewer detectors. The triangular array in ET offers advantages here.

- BBH short in ground-based observations, but will last months in LISA. And LISA's BBH counterparts will probably be long-lived X-ray sources, perhaps also jets, so the problem is not so critical as for ground-based.

Galaxy and cluster catalogues are incomplete, and difficult to make more complete.

- Have we developed quality goals for catalogues that match to our requirements with, say, 3G detectors?

- Will funders and telescope time-allocation committees support our ambitions?