"Self-Confusion"

Simple view of why this matters:

suppose we have 1 "interesting" inspiral at 1 Gpc

Then, if the rate density is constant, there will be 8 half strength inspirals at 2 Gpc ...

27 one third strength at 3 Gpc

-etc-

Eventually, this argument dies off - run out of volume in the universe, source evolution changes.

Reminder: each inspiral is in band for a few years!

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Is this really a problem?

Suppose the close one we want to measure, H, is in a background of lots of weak signals, h_i.

Go into the frequency domain: the background of weak signals looks just like noise with a bunch of evolving spikes. All the spikes evolve differently - problem is when the signal crosses the background spikes.

Real problem is if the density of spikes is high enough that the background is essentially continous.

2 Big questions:

1. What really is the capture rate? Are there really hundreds or thousands of binaries "on" at once?

   Dynamical process studies pretty hairy - lots of uncertainties.

2. What number of binaries is "bad"?

   Should be straightforward to assess this with Kludge waveforms: Monte-Carlo studies of N inspirals. Figure out how many of them can be measured well as "signals", how many are indistinguishible "noise".

What is a "Kludged waveform"?

- A waveform model that is <u>wrong</u>, but <u>useful</u>: easy to calculate & robustly fakes features of more rigorous models.

For compact body inspiral, we 1st imagine the inspiral dynamics is a geodesic strong field orbit with orbital parameters evolving:

$$\vec{Z}_{insp}(t) = \vec{Z}_{orbit}(t; \underbrace{E(t), L_z(t), Q(t)})$$

Abuse weak field formulae to learn how these "constants" evolve.

From the inspiral trajectory $\vec{Z}_{insp}(t)$ we can easily build some kind of waveform

Very crude example: use this to define some kind of quadrupole moment, take 2 time derivatives