ASI glitches for BNS vetoes

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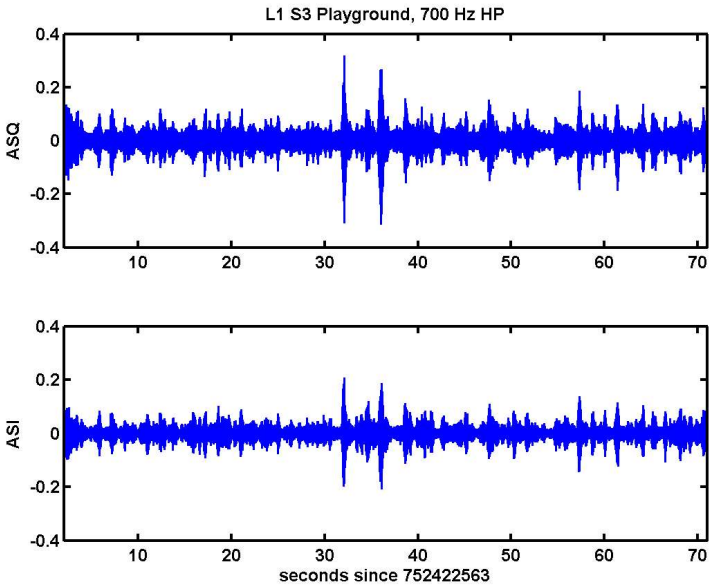
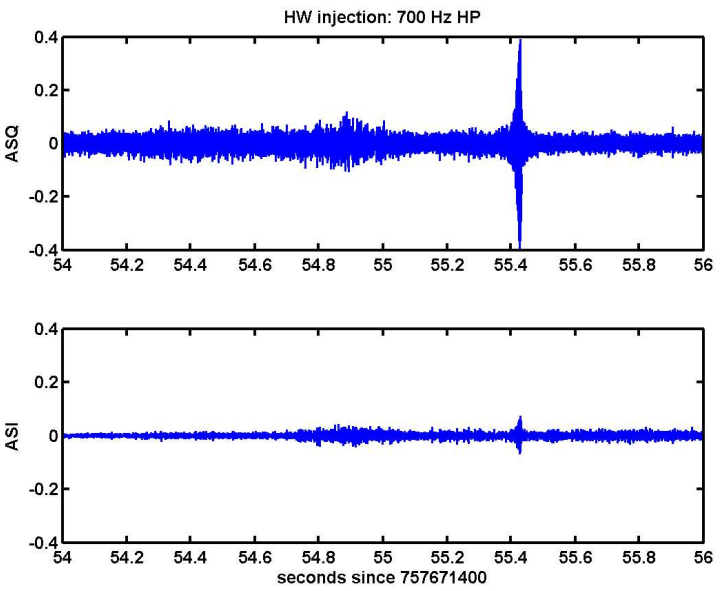
Outline

- Motivation
- Initial look at S3 playground events.
- Safety
- S3 Playground final results
- S4 and beyond...

Motivation

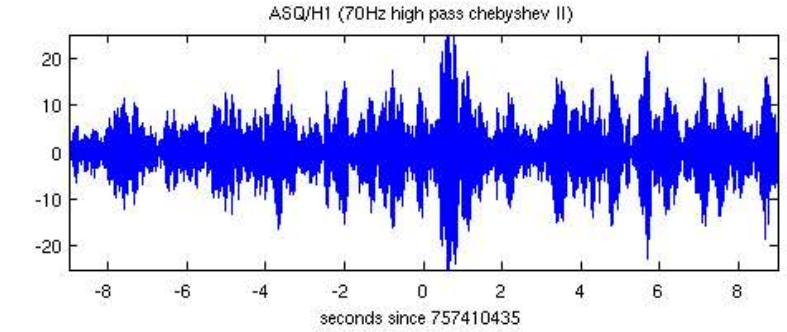
- The possibility of an ASI veto came about while investigating a loud L1 BNS trigger.
- Comparison to injections suggested it could be made safe.

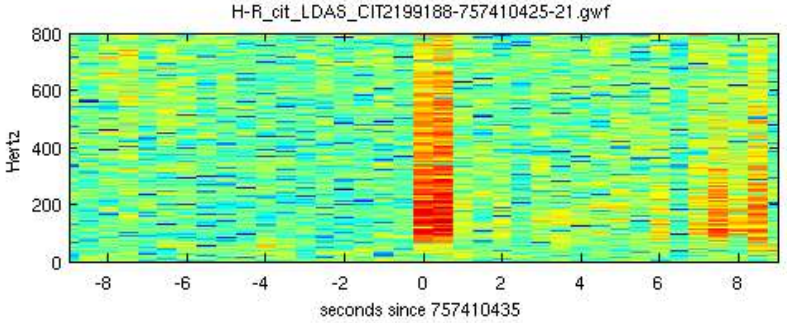


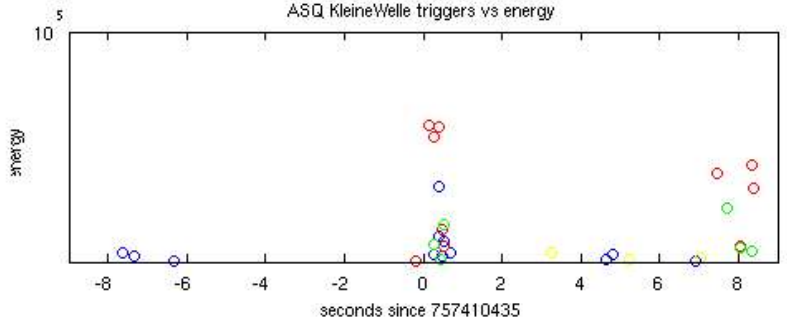


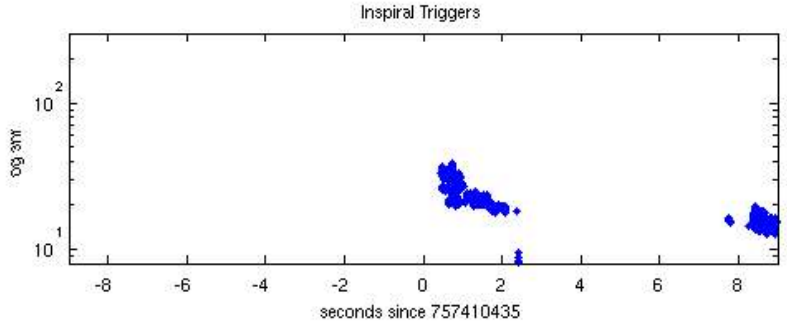
Initial Look at S3 data

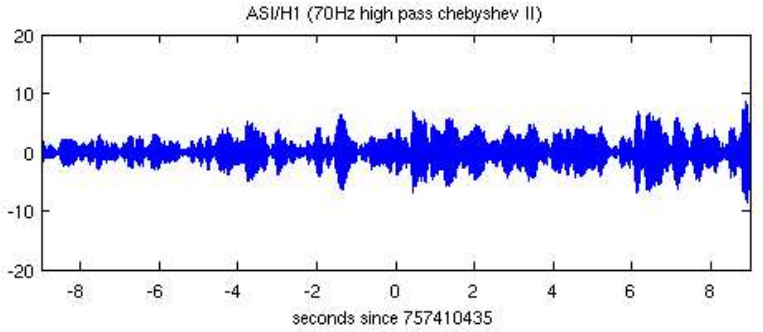
- We had a look at the 10 loudest BNS playground triggers for each IFO and generated ASI/ASQ plots.
- We found significant ASI correlation in many triggers.
- We looked at coincident ASI KW triggers to see if we might be able to construct a useful veto

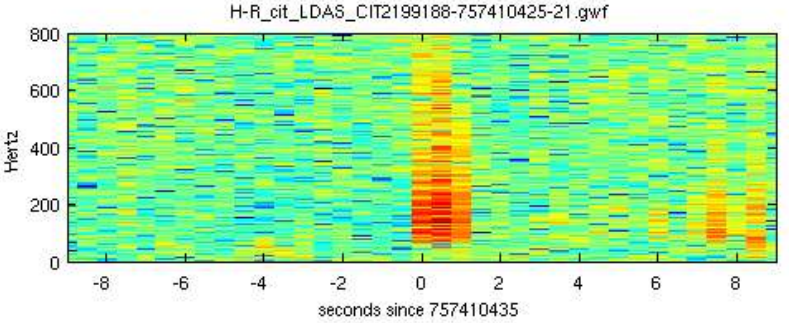

ASQ/H1 (70Hz high pass chebyshev II)
seconds since 757410435

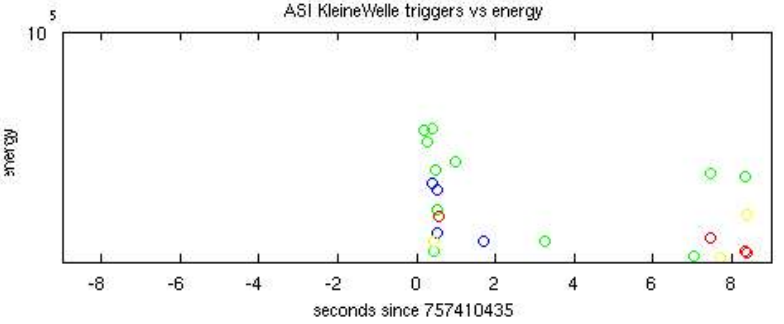

H-R_cit_LDAS_CIT2199188-757410425-21.gwf
Hertz
seconds since 757410435


ASQ KleineWelle triggers vs energy
energy
seconds since 757410435


Inspiral Triggers
seconds since 757410435

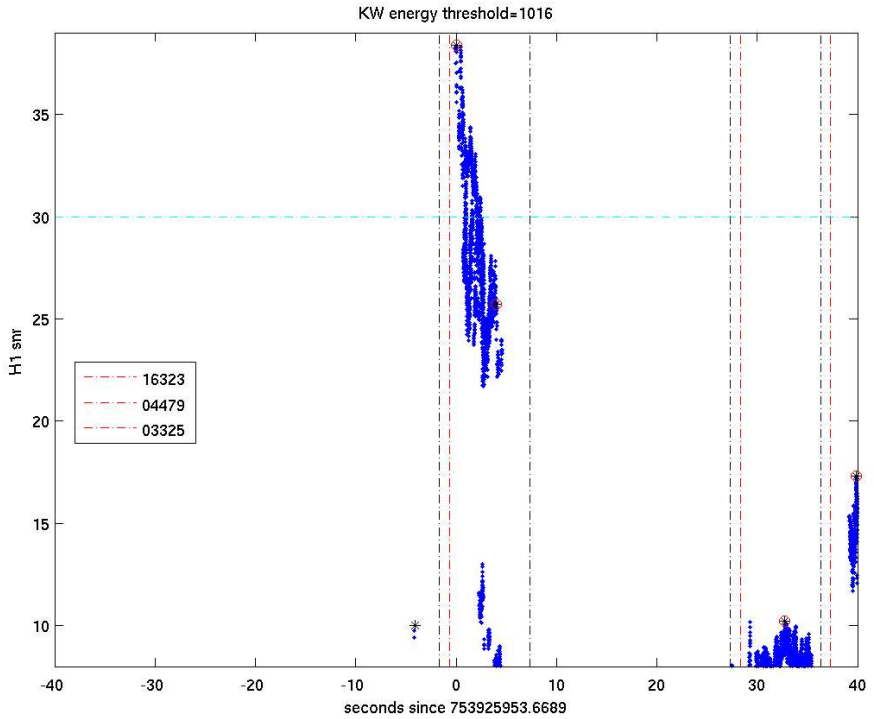

ASI/H1 (70Hz high pass chebyshev II)
seconds since 757410435

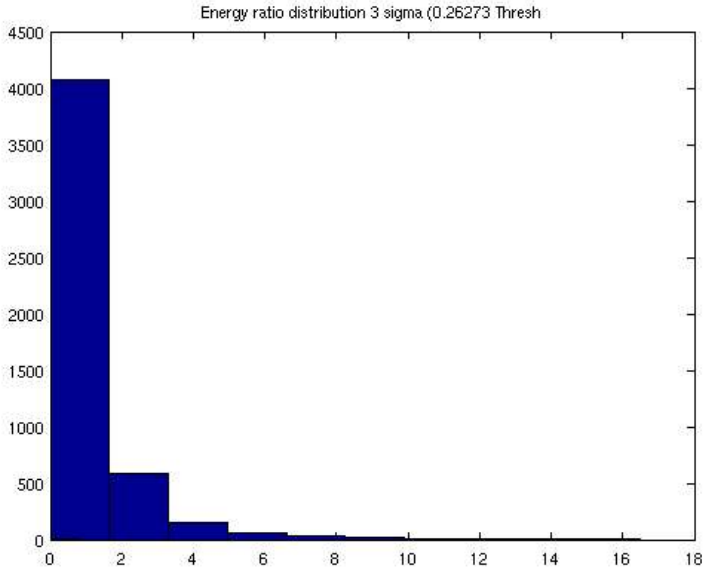

H-R_cit_LDAS_CIT2199188-757410425-21.gwf
Hertz
seconds since 757410435

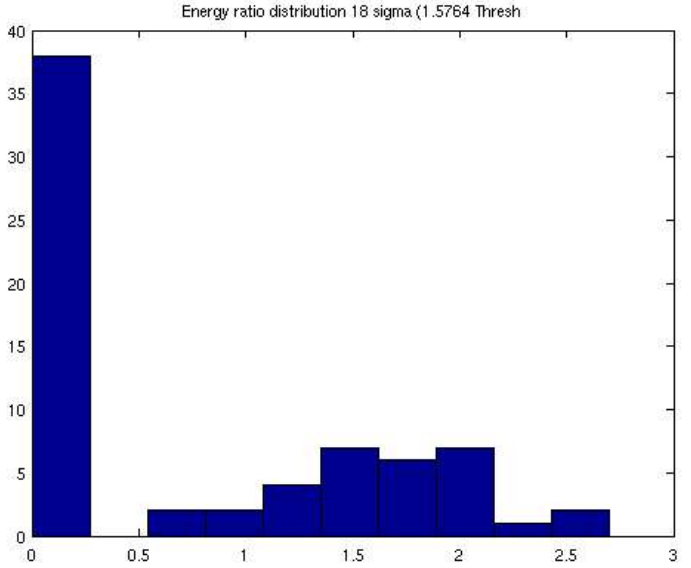

ASI KleineWelle triggers vs energy
energy
seconds since 757410435

Parameters

1. KW energy threshold (1.5)
2. KW ASQ/ASI ratio (2.0)
3. Veto window (-1, +8)



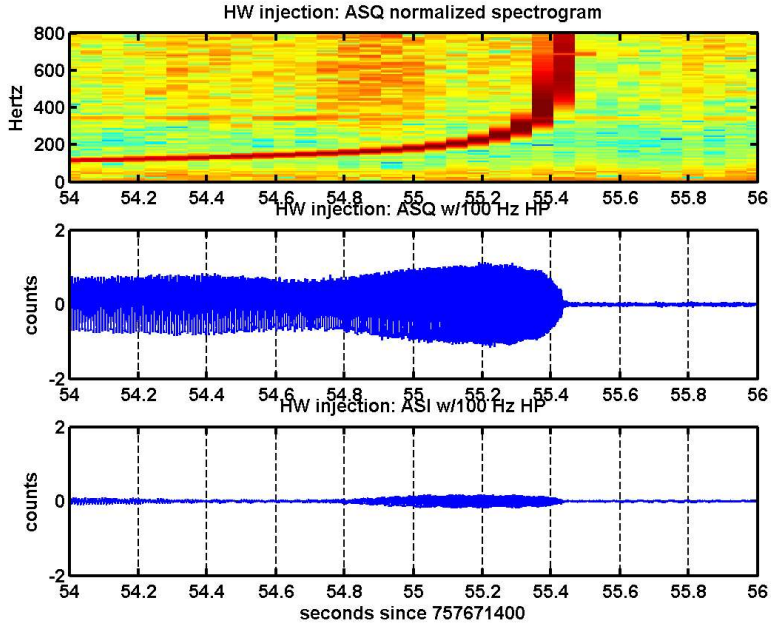


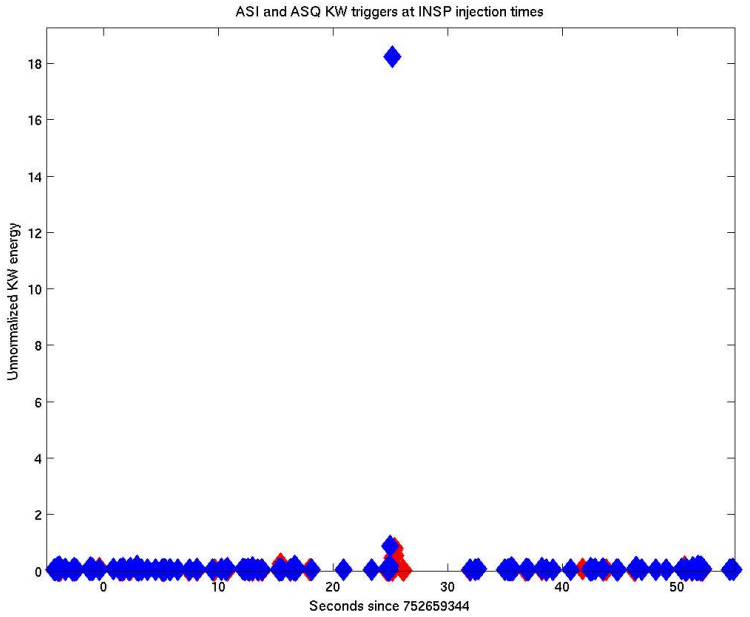


The Dreaded Question of Safety

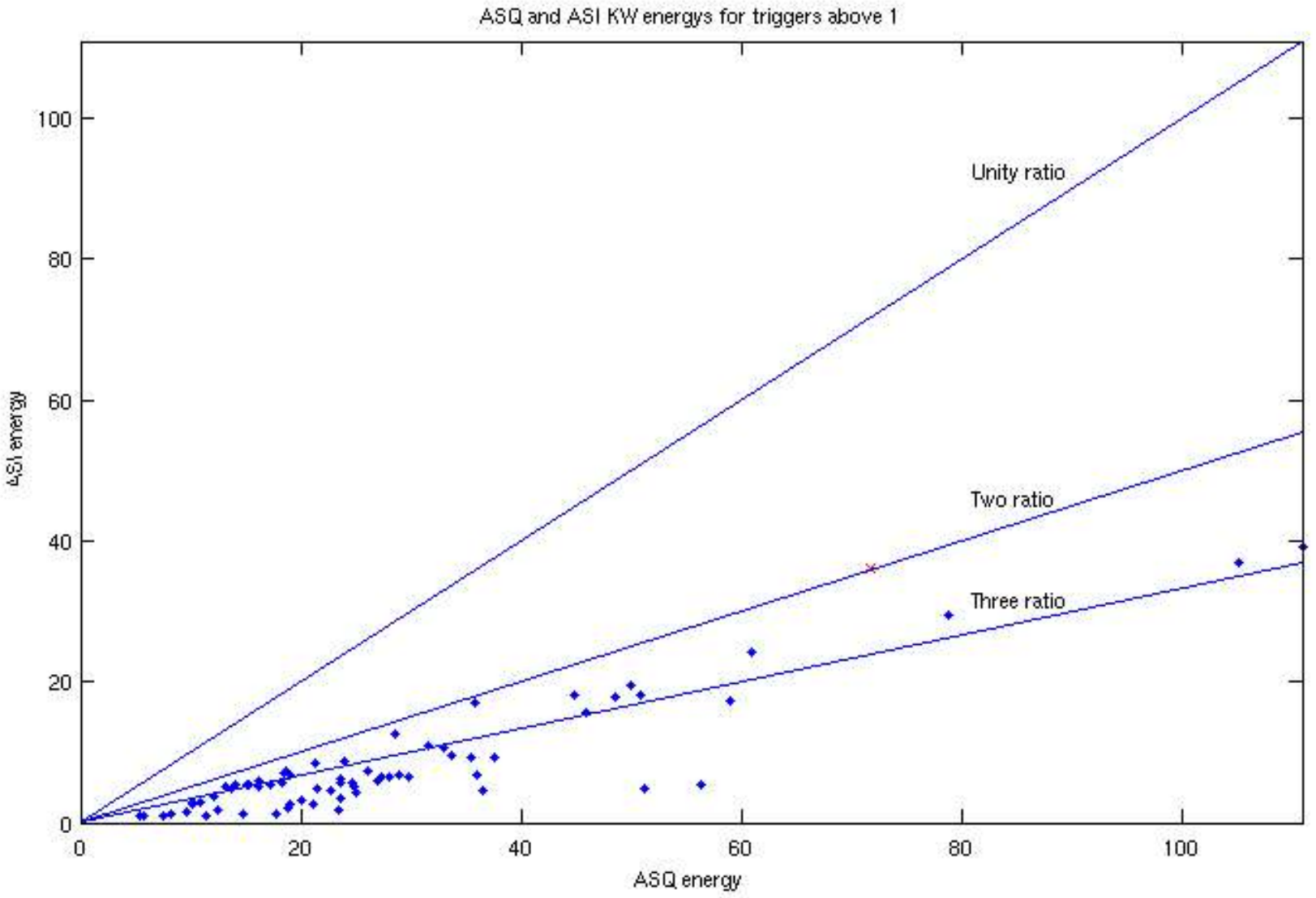
- Is it safe to use the ASI channel for vetoes?
- NO. ASQ and ASI are known to be coupled.
- But we can choose a safe ratio from injections.

(S3 injections had bad endings which may have produced excess ASI signal)

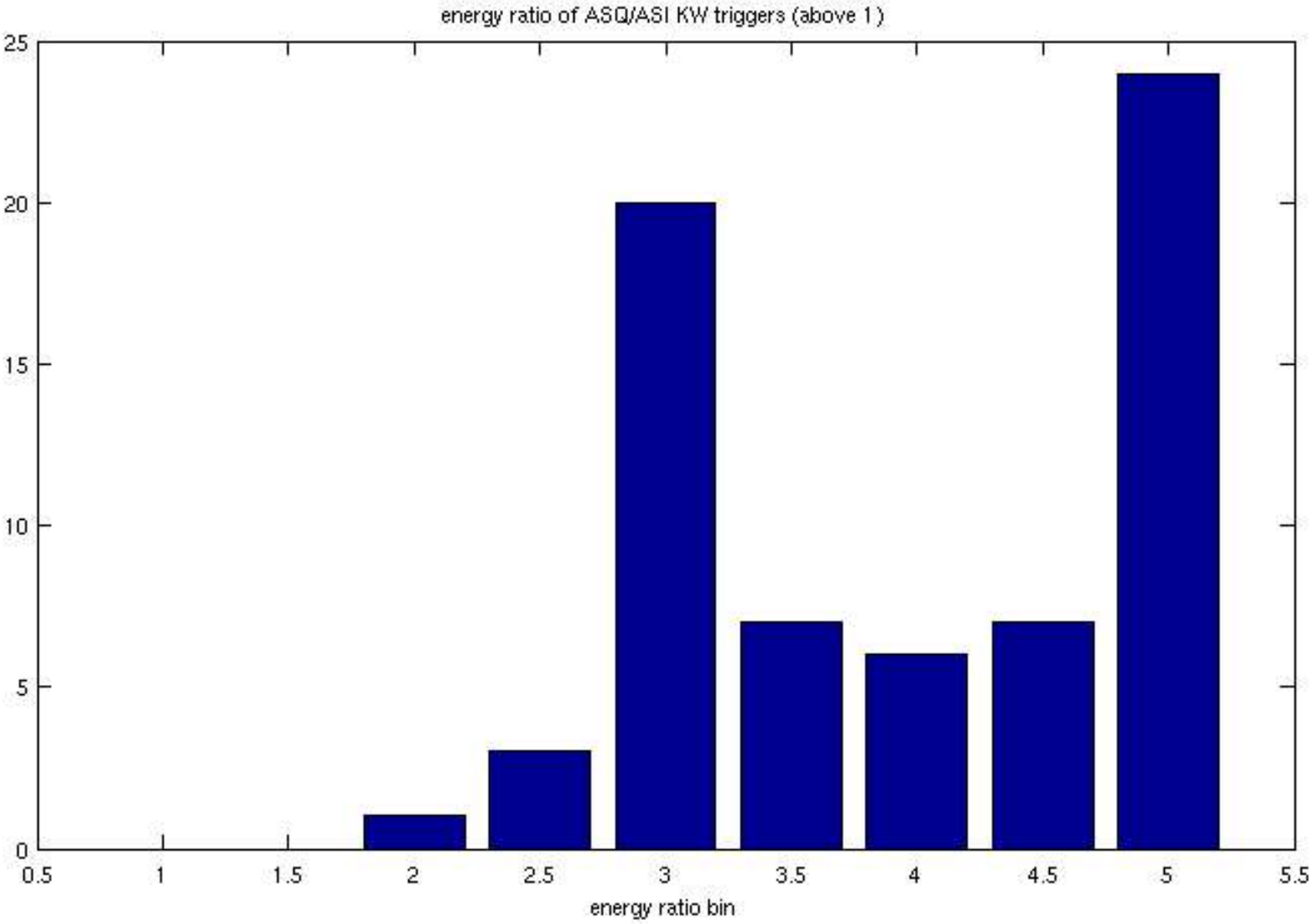




Results from Hardware Injections



Distribution of KW ASQ/ASI ratio for injections

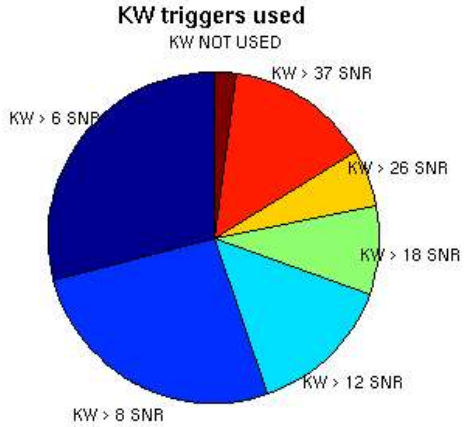


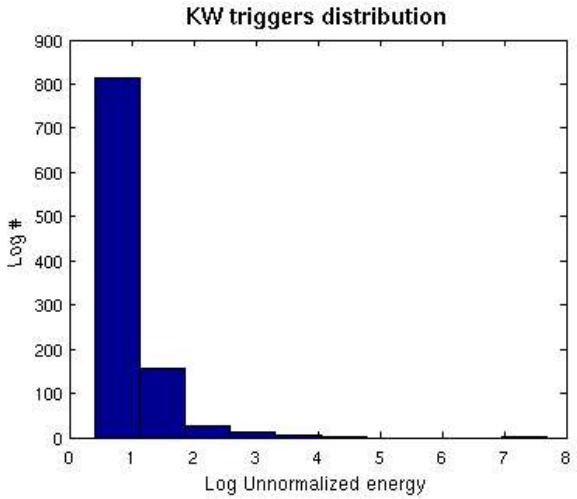
S3 Playground Final Results

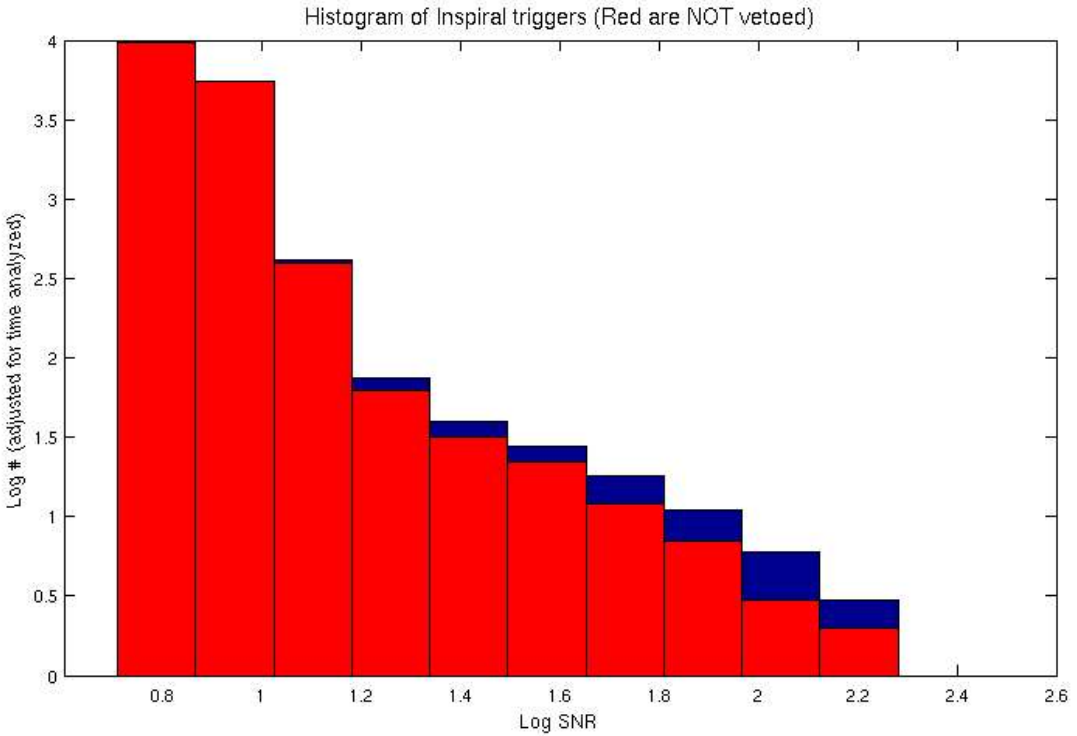
- We only considered H1 for the ASI veto because:
    1. We didn't have adequate hardware injections for L1.
    2. H2 had a successful PRC_CTRL veto (work by Nelson Christensen)
- We vetoed 1/3 of the BNS triggers above 60 SNR (actual efficiency might be better)
- Used 90% of the KW triggers available for veto.
- Had an extremely small deadtime - .33%

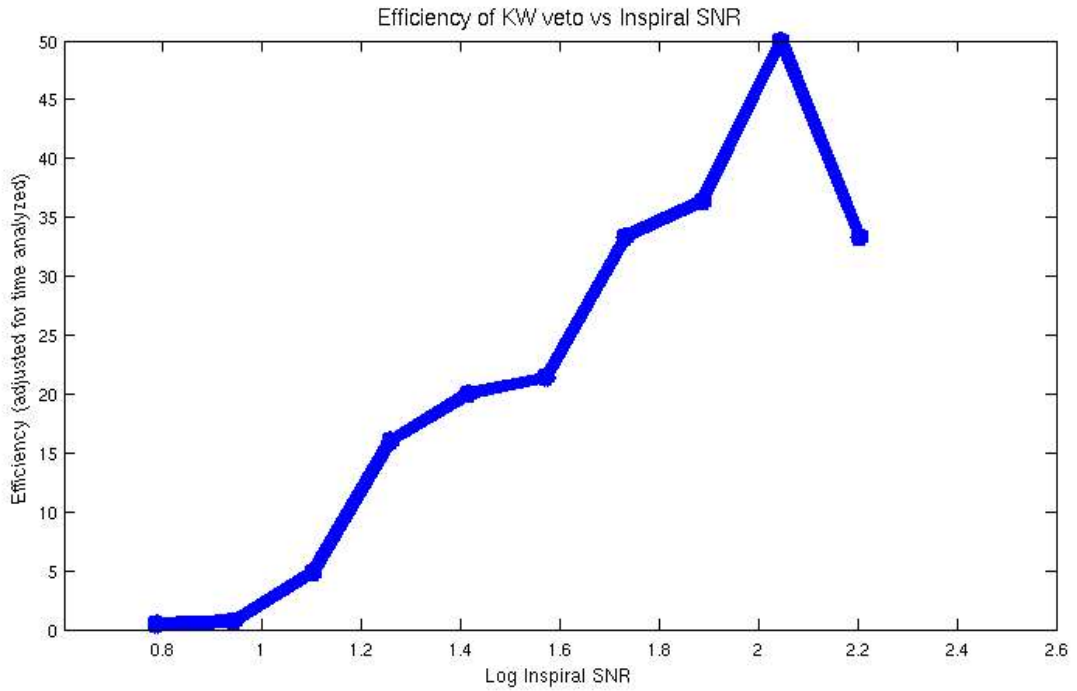
Summary Information

GPS range: 751702383 - 757645593
Number of clustered inspiral triggers: 9755
Number of available KW triggers: 28
Used percentage: 89.2857%
ASI KW energy Threshold: 1.5
ASQ/I KW energy ratio: 2
Time analyzed by inspiral: 75290
Overlap with KW analysis time 100%
The deadtime is 0.33471%



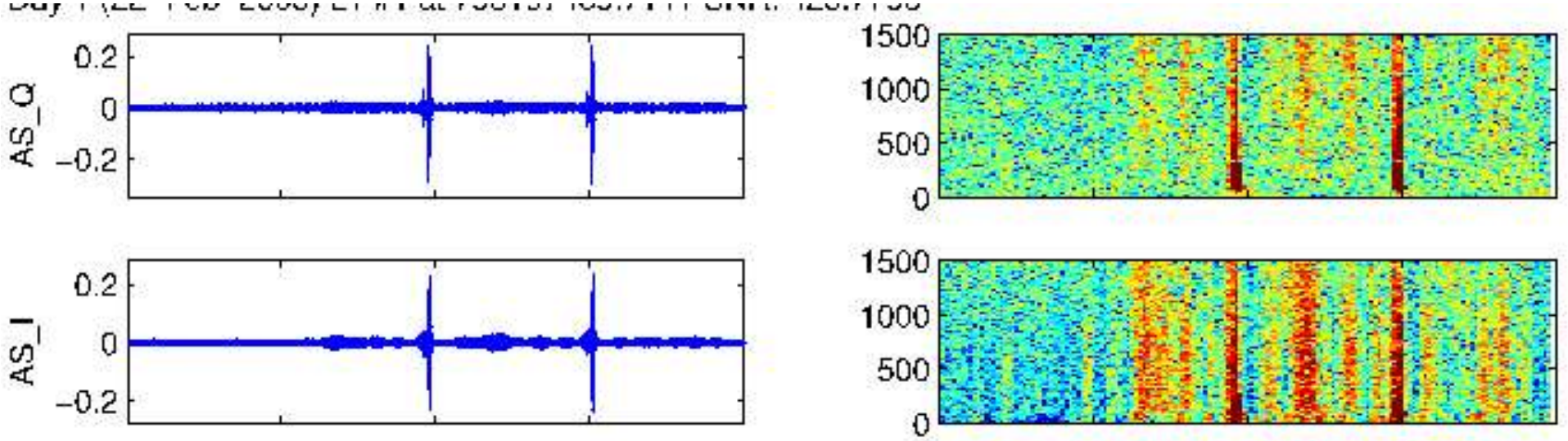






S4 and Beyond

Although I haven't begun the S4 analysis, everything is in place to do so. However daily summary plots made by Alex Dietz seem to suggest that an ASI veto will be useful.



And Safe???