S2 Inspiral Hardware Injections

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Improvements for S2

- More comprehensive set of injections (Brady, Chickarmane, T Creighton)

- Larger range of masses and distances:
  - 15 to 500 kpc
  - (1.0,1.0), (1.4,1.4), (10.0,1.0), (10.0,20.0)

- Regular injections as well as extended injection run (Marka, Leonor, Shawhan)

- Record excitation channel to know injected signal

- Spaced injections further apart to avoid corruption of PSD

Use of Injections in S1 Analysis

- The S1 injections were used in the validation and verification of the pipeline

- Detected a timing discrepancy between hardware and software injections

- Prompted a very thorough analysis of the whole pipeline to determine source of discrepancy

- Used S2 hardware injections, since had EXC channel recorded

- Traced the discrepancy different uses of the template generation code

Use of Injections in S1 Analysis
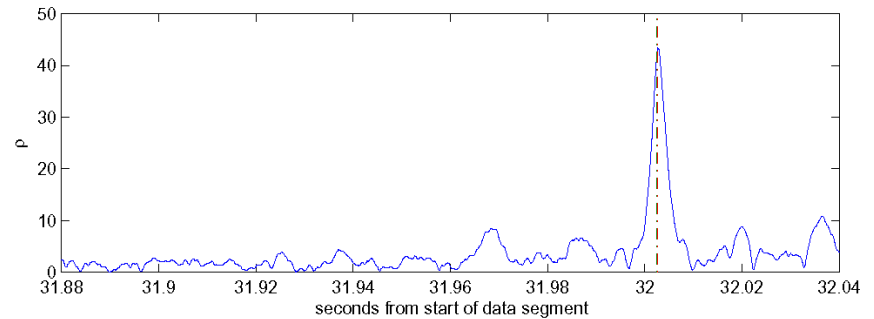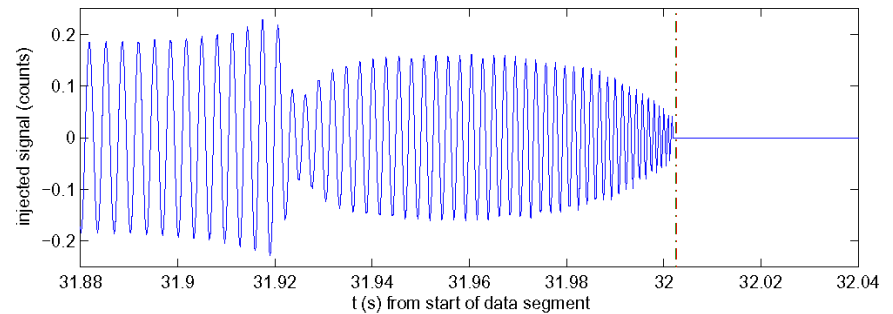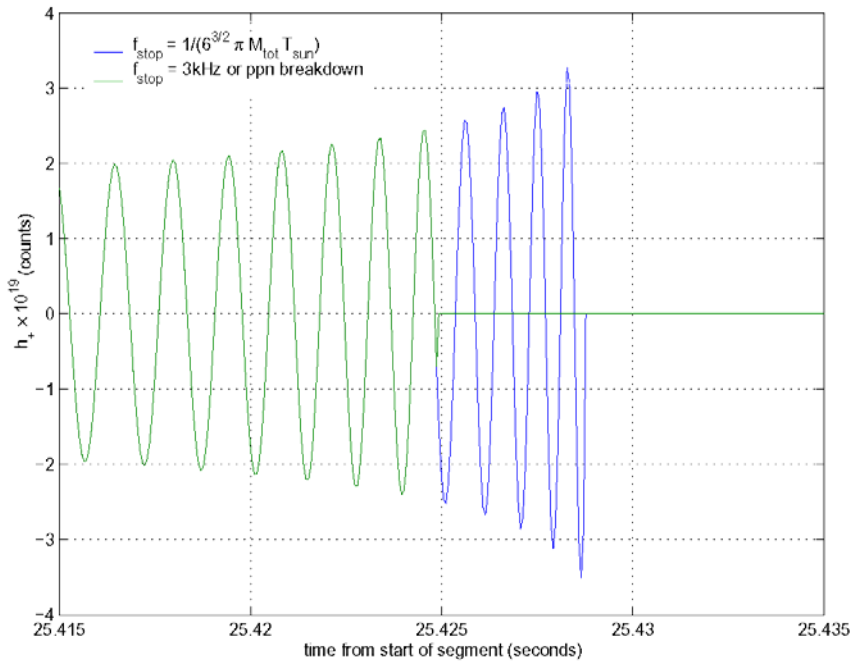
- Confirms that the software injections are good!

S2 Hardware Injection Plan

- Analyze a small amount of the S2 injection data from all IFOs as an initial check. Keep others blind.

- Provide feedback to calibration team from initial data

- Study correlation between possible veto channels

- Develop inspiral pipeline based on data quality cuts, triggers in playground data, vetoes, etc.

- Use S2 hardware injections as a final check on the pipeline

Preliminary Results (Christensten)

- Veto and Detector Characterization Studies: Looked at H1 and L1 in injected signals as a means of helping to verify the safety of certain vetoes.

- The most important effect so far had been to cast doubt on the safety of use of ITM_OPLEV signals as vetoes.

- We are looking at these injected events as part of glitch/correlation/bicoherence studies.

Preliminary Results
with Online Calibration