Spectral Line Catalogue Status

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for the

Spectral Line Catalogue Sub-Group

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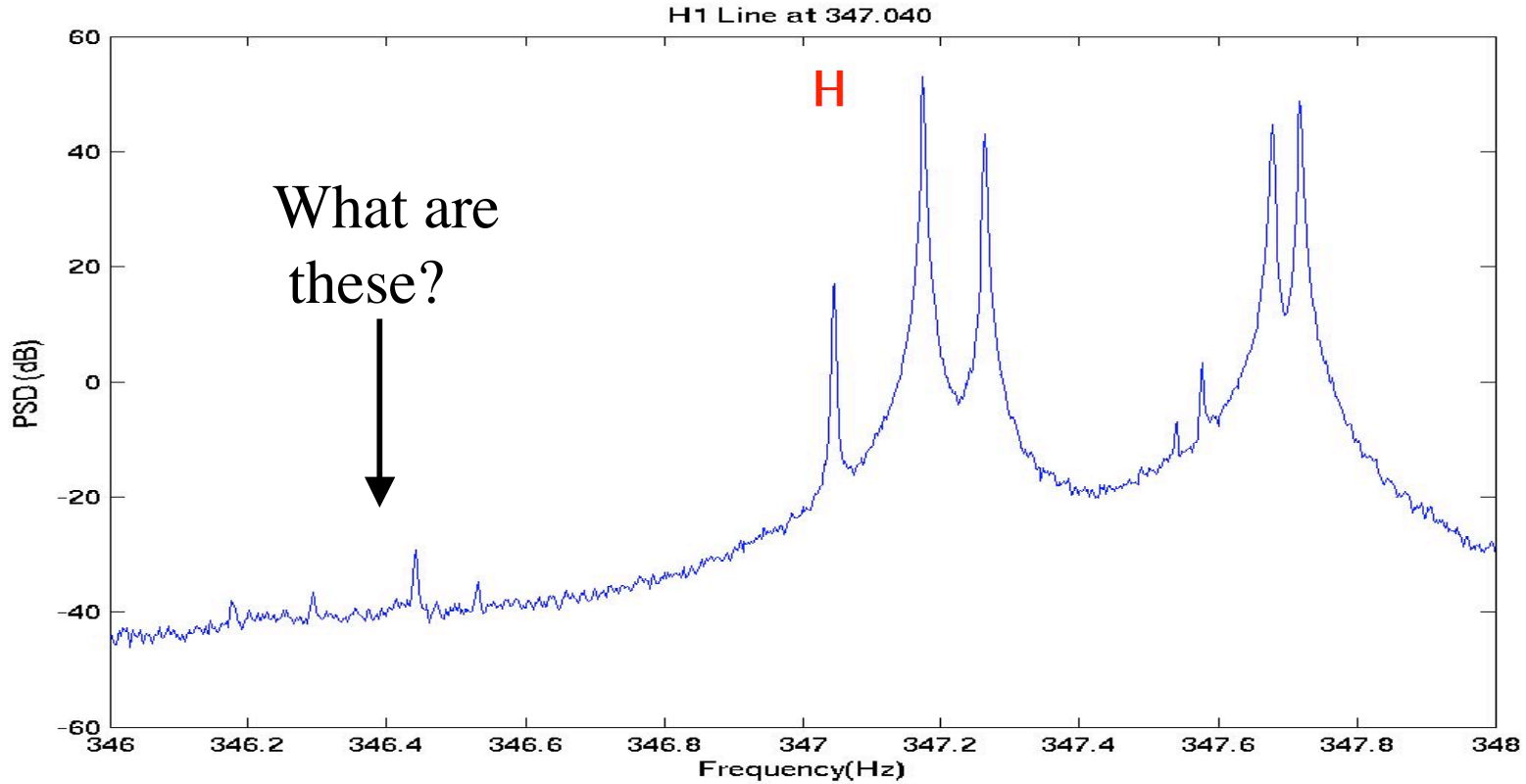
Spectral Line Sub-Group

- Formed following the March 2005 LSC meeting
- Sub-Group charge includes
  - » Cataloging of spectral lines found by analysis teams
  - » Identify sources of these lines
  - » Work to remove most problematic ones
  - » Provide monitoring of lines to track progress, etc.
- Initial focus are lines up to first violin modes ("sweet spot" of the detector)
- We still need some "coherence" in our efforts

Initial S4 Spectral Line Catalogue

- Built from near-online monitor results, manual checks
  https://gravity.psu.edu/~s4/detchar/S4_Spectral_Lines.html
- Includes high-res PSDs of each line
- Have added some tentative identifications
  - » Violin mode resonances, power-line harmonics, H2 RF oscillator
  - » We now see either more sidebands in the violin modes or unassociated lines in the same area
- Much work still needed
- All are welcome to improve this list

Violin Mode Region



Coherence Studies (Vigeland)

- Search for correlations between AS_Q and PEM channels (building on V. Mandic's work)

  http://virgo.physics.carleton.edu/Sarah

- Found several AS_Q-PEM matches
  - H1 - (57, 76, 256, 308.81, 335.08) only weak
  - H2 - **54, 59.04, 119.87, 239.75, 367.9**
  - L1 - 112,**115.5**,128,**142.97,153.97**,189,**190.6 777.89,1000**
- These should be good remediation candidates, as we have a trail to follow
- Also studying coherence between H1-L1 PEM channels

The 1/4 Hz Line Story

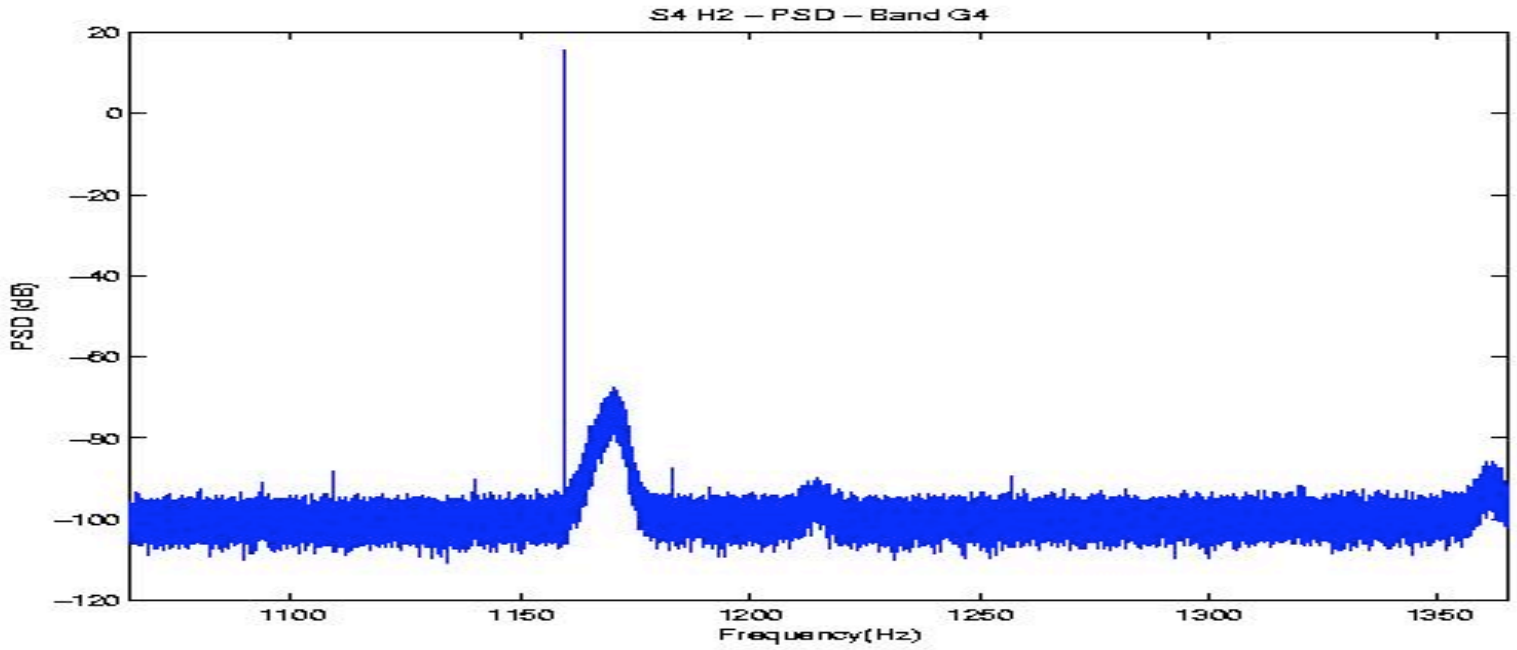
- Pulsar Group spectral line searches (Dergachev) report comb of very-narrow 1/4 Hz lines
- These were not found by AS_Q-based searches
- Mike Landry has found the reason (source is DARM_CTRL used to calibrate pulsar data)
- Pulsar group is modifying S4 calibration method
- The hunt is on to remove this (memory/electronics?)

Work on removing Spectral Lines

- Gleaned from P. Fritschel's plenary talk (incomplete)
  - » H2 - Crystal oscillator installed to remove 37 Hz comb
  - » L1 - Suppressed 1Hz sidebands on 60 Hz from heaters
  - » L1 - General reduction in power-line harmonics
  - » R. Schofield's work on acoustic coupling
- This is great news, but certainly more is needed
- These need to be followed up with line-monitoring in Astrowatch data!
  - » Good way to actually measure progress (and check that things stay fixed)

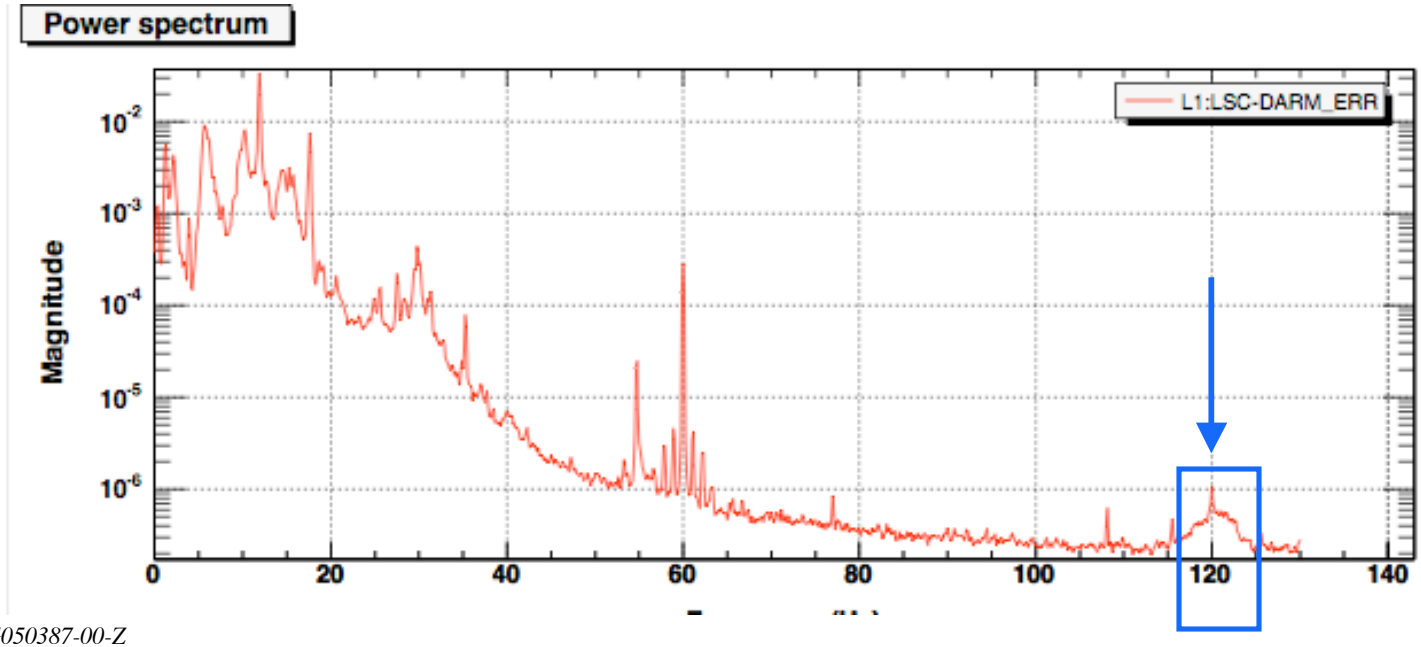
Wandering Line in H2

- Persistent, drifting broad peak (1160 - 1190 Hz)
- Significant problem for Burst, Pulsar searches



Wandering Line in L1

- Drifted from 50-150Hz in S4, about 5Hz wide
- Supposedly fixed on March 10th - replaced DAC for photodiode
  - » Appeared to be microphonic, from cooling airflow in crate
- BUT seen again on March 19th (N. Christiansen) around 120 Hz



Plans for run-up to S5

- Search groups - identify lines with biggest impact on physics analysis
  - » Pulsar - 1/4 Hz, wandering L1,H2 lines
  - » Burst - wandering lines, powerline harmonics, lines > 1kHz
  - » Stochastic - inter-IFO coherences
- Track wandering lines in S4 for Pulsar work
  - » Figure out how to track broad, wandering lines in software
- Run line-finders daily on Astrowatch data
- Integrate LineMon results in reporting

Schedule work, trips to sites to help fix worst problems, instead of just complaining!