

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
- LIGO -
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Data Quality Shift Policy

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Data Quality (DQ) shifts are an excellent method for tracking the quality of the data from the LIGO interferometers, both from an instrumentation and a search point of view. By conducting these shifts rapid feedback can be given to commissioners on-site if something detrimental to the data quality occurs, thereby reducing the amount of sub-optimal data. In addition, by constantly studying the output of the detectors, DQ shifts will play a central role in the confidence of a detection. These shifts provided vital feedback in the first observing run and in the detection validation procedure of both GW150914 and GW151226.

DQ shifts are studies of 3 to 4 days duration of data from one of the LIGO interferometers undertaken by a designated individual. The individual is expected to study the output of one detector every day to look for data quality changes which may adversely affect a gravitational wave search. Daily studies of the interferometer are to promote rapid feedback with commissioners should a significant change occur. The individual will document their daily studies in a ‘DQ Shift Report’ which will be presented to the Detector Characterization (DetChar) Group. Finally the individual is to summarize their findings and post an aLOG entry to the relevant site.

1 Details

The most up to date information about DQ shifts can be found on a subsection of the data quality wiki:

https://wiki.ligo.org/DetChar/DataQuality/WebHome#Data_Quality_Shifts

This area is regularly maintained and links are available to DQ tool training telecons, DQ Shift instructions (i.e. how to conduct a DQ shift), links to recently conducted and upcoming DQ shifts, and a list of current DQ volunteers (links to these areas can be found in the section 5). DQ shift volunteers must go through a period of training before conducting their own shift (explained in section 3). This is to ensure that each shift is conducted consistently to a high standard. Not only will this aid detector characterization operations as a whole, but this will also ease the validation process when there is a candidate gravitational wave event.

Each DQ shift will focus on one interferometer only. The main resources which will be used in a DQ shift are the LIGO summary pages and aLOGs (remember the summary pages are given in UTC and the aLOGs in local time to the site):

- LHO
 - <https://ldas-jobs.ligo-wa.caltech.edu/~detchar/summary/>
 - <https://alog.ligo-wa.caltech.edu/aLOG/>
- LLO
 - <https://ldas-jobs.ligo-la.caltech.edu/~detchar/summary/>

– <https://alog.ligo-la.caltech.edu/aLOG/>

DQ shift volunteers will consult these resources and document their findings on a separate wiki page (all DQ shift wiki pages are obviously named - this will become clear before a volunteer conducts their own shift). A volunteer will use this wiki page as their report which they will present to DetChar in 5-10 minutes on a scheduled telecon. The content of the aLOG (about 6 bullet points in length) will also be taken from this report (which should be linked) and posted to the relevant site.

LSC Fellows will be on hand to assist DQ shift volunteers should they have questions about on-site activities. In addition the fellows will also help in conducting long term investigations should interesting features occur in a DQ shift. During an observing run, it is expected that DQ shift volunteers communicate their daily findings to LSC Fellows on site, so that relevant information can be communicated to the commissioners relatively quickly. Therefore a daily telecon will be set up between at least one fellow and the DQ shift volunteer.

An example timeline outlining the cadence of each DQ shift, the presentation of the report and the latest day to write an aLOG is given in Table 1. DQ shifts are typically conducted between UTC days. For example Shift 1: Monday 00:00 UTC - Wednesday 23:59 UTC, Shift 2: Thursday 00:00 UTC - Sunday 23:59 UTC.

2 DQ Shift Coordinators

There are two DQ Shift Coordinators, who are tasked with ensuring the smooth running of the DQ Shifts both inside and outside an observing run. The coordinators will help to/find a mentor when new volunteers come forward and also help to/find a mentor for those who need assistance when conducting their shift. As of July 2016 they are Jess McIver (jessica.mciver@ligo.org) at Caltech and Laura Nuttall at Syracuse University (laura.nuttall@ligo.org).

3 Procedure for becoming a DQ Shift Volunteer

New people are welcome to start training to become a DQ Shift volunteer at any time. It is required however that each person who undergoes training commits to being available to undertake DQ shifts for the next calendar year. This will likely entail 3-6 shifts. If an individual cannot commit to this length of time please contact DetChar for other projects you can become involved with.

DetChar is asking all new DQ shift volunteers to undergo a period of training before they conduct their own shift, so that each DQ shift is completed to the same standard. If you would like to become a volunteer (and can commit to the time period) please contact the DQ shift coordinators (section 2) so that you may be added to the list of DQ shift volunteers in training. Next start your initial training:

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week 1	DQ Shift 1			DQ Shift 1 Presentation (TS: 12pm Central) aLOG no later than this date	DQ Shift 2		
Week 2	DQ Shift 2 Presentation (TS: 11am Central) aLOG no later than this date	DQ Shift 3		DQ Shift 3 Presentation (TS: 12pm Central) aLOG no later than this date	DQ Shift 4		

Table 1: A two week example timeline outlining the format of DQ Shifts for a given detector. DQ Shifts are typically conducted between UTC days. DQ Shifts are always presented on TeamSpeak (TS) in the DetChar channel during a DetChar telecon. The time is specified in the table. Also specified is the latest date the DQ shift volunteer must post an aLOG by summarizing their findings.

- Attend the main DetChar Telecons (Monday 11am Central on TeamSpeak). This is to give the volunteer an idea of what is generally happening in DetChar. We ask you to attend as regularly as possible.
- Become familiar with the summary pages as this is one of the main resources you will be using in your DQ shifts. There are 9 training telecons which will take you through the summary pages (DCC: G1500145), please listen to them all.
- Read all the current documentation about DQ shifts. These are the links given in section 5.
- Redo a DQ shift that has already been conducted and compare your findings with the original.

After all these items have been completed please contact the DQ shift coordinators to inform them that you have completed the initial training. The next step is about gaining experience. To begin with, the new volunteer will shadow another volunteer who is conducting a shift. The DQ shift coordinators will work with the new volunteer in finding an appropriate person to shadow. Once this is completed the new volunteer will work with the DQ shift coordinators to sign up for and find a suitable mentor who will assist them in their upcoming DQ shift.

Anyone who has not conducted a DQ shift in aLIGO must complete this training before conducting a DQ shift on their own; conducting a shift in S6 does not count. The DQ shift coordinators will assess when a DQ shift volunteer does not need a mentor to conduct their shift. Remember though that the DQ shift coordinators and DetChar are available to help with questions when a DQ shift volunteer is on shift.

4 Assigning DQ Shifts

Outside of observing runs the DQ shift coordinators are responsible for assigning DQ shifts as the detectors lock or during an engineering run. This will be done by cycling through a list of trained/in-training volunteers and emailing each in turn to check if they are available to conduct a DQ shift.

During an observing run the DQ shift coordinators will call for trained DQ shift volunteers to sign up for DQ shifts on the relevant wiki page. For O2 this is

<https://wiki.ligo.org/DetChar/DataQuality/O2DQShifts>.

Here trained volunteers will be able to sign up for DQ shifts of their choosing, and the DQ shift coordinators will maintain this page. Do remember that only trained volunteers may sign themselves up. Should a DQ shift volunteer in training wish to conduct a shift they must coordinate with the DQ shift coordinators as a mentor will be required.

5 Documentation

- DQ shift instructions: <https://wiki.ligo.org/DetChar/DataQuality/ShiftInstructions>
- DetChar FAQ: <https://dcc.ligo.org/LIGO-G1400062>
- How to read the summary pages: <https://dcc.ligo.org/LIGO-G1401357>
- DQ shift training telecons: <https://dcc.ligo.org/LIGO-G1500145>

6 Useful Links

- GW150914 DetChar paper: <http://arxiv.org/abs/1602.03844>
- Pre O1 DetChar work: <http://arxiv.org/abs/1508.07316>
- S6 LIGO DetChar Paper: <http://arxiv.org/abs/1410.7764>
- DetChar wiki: <https://wiki.ligo.org/DetChar>
- Detchar Tools wiki: <https://wiki.ligo.org/DetChar/Tools>
- Past and Present DQ Shifts:
 - S6: <https://wiki.ligo.org/DetChar/GlitchStudies>
 - ER6: <https://wiki.ligo.org/DetChar/DataQuality/ER6DataQualityShifts>
 - Pre O1 (February 2015 - September 2015): <https://wiki.ligo.org/DetChar/DataQuality/PreO1DQShifts>
 - O1: <https://wiki.ligo.org/DetChar/DataQuality/O1DQShifts>
 - ER10/O1: <https://wiki.ligo.org/DetChar/DataQuality/O2DQShifts>
- Current Volunteers: <https://wiki.ligo.org/DetChar/DataQuality/DQShiftVolunteers>
- Indrouction to aLIGO for DQ Shift Volunteers: <https://dcc.ligo.org/LIGO-G1500980>

7 Contacts

DQ Shift Coordinators: Jess McIver (jessica.mciver@ligo.org) and Laura Nuttall (laura.nuttall@ligo.org)

DetChar Chairs: Andrew Lundgren (andrew.lundgren@aei.mpg.de) and David Shoemaker (dhs@mit.edu)

Detchar: (detchar@ligo.org)