

LSC Six-Month Progress Report

Organization: Balearic Islands University Relativity Group (UIBRG)

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a) Detector Characterization:

Sintes has been leading the GEO detector characterization efforts and serve as liaison between GEO and LIGO/LSC on detector characterization matters.

b) Periodic Sources Upper Limit Group:

Sintes is a member of the PSUL group and participates in the group activities attending the regular telecons and in the development of the Hough Hierarchical Pulsar Algorithm.

In collaboration with AEI, we have developed the ‘driver’ code to perform the incoherent Hough search for isolated pulsars, for a wide sky area and large frequency band, including spin-down parameters. Condor scripts have also been produced to be able to run the code on a cluster.

In the last 6 months, we have developed a robust PSD estimator based on the running median code by Mohanty and we have investigated the bias introduced by using the running median in relation with the block size. We have provided a function in LAL that provides the correct normalization factor for different block sizes. This is needed for the ‘peak selection’ stage and it is also used by other search strategies that use the running median PSD estimator.

Statistical analysis of the Hough maps have been investigated, as well as the sensitivity of the search and the optimal thresholds in order to optimize the false dismissal rate at a given false alarm rate. A paper with other collaborators is in preparation.

Driver code has been used to analyze LIGO S2 data in a 300 Hz band. The code has been extensively used on SFT data and on ‘cleaned’ line artifacts data in order to understand the impact of lines using this strategy.

A preliminary second code to set up a frequentist upper limit using Monte-Carlo signal injection has been developed and tested. Several bugs were identified, but its performance is not satisfactory in order to set upper limits for, say, a 300 Hz band for each 1 Hz. This suggests to recode ‘makefakedata’ used in all the frequency domain search codes to avoid unnecessary IO and speed up the code. Thus upper limits have been provided so far for a clean 1 Hz band.