

LSC Six-Month Progress Report

Organization: Balearic Islands University Relativity Group (UIBRG)

Report Date: February 15, 2003

a) Detector characterization:

Sintes has been leading the GEO detector characterization effort. This is a collaborative work of scientists from different groups (Golm, Hannover, Cardiff, Glasgow, Birmingham, UIB) joined in the GEODC group [http://www.aei.mpg.de/~sintes/GEO_DC/]. In this period she has organized regular conference calls and a co-organized a GEO meeting [October 23-25, 2002, AEI-Golm].

Sintes has been involved in the coincident LIGO-GEO600 science run 1, taking shifts at the GEO site, and analyzing the data from environmental and instrumental monitors, employing time-domain, frequency-domain and time-frequency techniques.

Together with Simon Berger and Yousuke Itoh at AEI, an automated line detection code was developed and used. It is based on a robust algorithm (suggested by Mohanty), using running median and interquartile ranges, able to detect the various species of lines: ultra-thin lines, thin lines or broad-lines, which can appear isolated or crowd together. [*S Babak, S Berger, Y Itoh, S Mohanty and A M Sintes, 2002, Auto Line Detection. GEO Technical document.* <https://info.geo600.uni-hannover.de/cgi-bin/dcnote.pl?nb=notebook&action=view&page=163>]. Using this code, we analyzed several channels and detected hundreds of lines, which were collected on a MySQL database '*GEO 600 Resonance Frequencies database*' available on the web. <https://info.geo600.uni-hannover.de/frequencies/>

b) Hough Hierarchical Pulsar Algorithm:

In collaboration with AEI, we have developed two flavors of the Hough transform able to deal with (a) demodulated data (DeFT, output of the F-statistics) and (b) non-demodulated SFT data. This is a new feature. Both versions have been implemented and merged together with the existing LAL houghpulsar package. Some data structures have been modified to be able to deal with both cases, and one new function was added -the one computing the new Hough master equation, that is different in both cases-. There is also more flexibility in the patch size. 8 test codes are provided to test the different functionality. The new functions were committed to LAL but documentation needs to be updated and further testing is required to ensure there are no bugs for any particular case. In both cases, stereographic projection is used. In case (a) sky patches can be very small depending on T-coh. But in case (b), in principle we could do a full sky search in one go. Because of the stereographic projection used, I recommend to split the sky at least into 6 pieces as if it was a cube. Therefore, we have now the choice to deal either with SFT data or DeFT data coming from a first coherent integration, depending on the kind of search we want to perform. The hough module can search over any spin-down/up parameter order

c) The module VectorPolar.c included in the LAL package vectorrops/ was modified in order to improve the unwrap functions.

d) Periodic Sources Upper Limit Group:

Sintes has participated in the activities of the PSUL group and has been invited to present their results at the Recontres de Moriond

e) Grid Computing:

Sintes has been following the LIGO grid activities, but the great distance made not possible for her to join the weekly GriPhyN-LIGO status teleconference.