LSC Six-Month Progress Report

LIGO-M000312-00-M

Organization California State University Dominquez Hills Elementary Particles and Relativity Group

Report Date August 15, 2000

Attachment A - LIGO I

Participation

Simulations that are Relevant to the 40m IFO Upgrade

As a test and a warm-up we undertook simulations for the old 40m (power- recycling-only configuration) that produced results that were consistent with approximate analytical calculations. We carried out optical simulations for the upgraded (dual recycled) 40m using the fft program and the planned 40m (as of 8/15/00) configuration. The simulations required use of the relatively untested dual recycling version of fft. We corrected several relatively minor errors in the code form the repository and to our knowledge for the first time conducted 40m simulations with fft in which computational artifacts were correctly removed. Our initial results for the upgraded 40m are consistent with expectations and yield the proper limiting results with no signal recycling. We have formulated mirror maps that include realistic non-uniformities using Zernike polynomials and random aberrations. We plan to run full imperfect optics simulations in the near future using a version of fft that runs under the MPI architecture at CACR.

Work on Preparing the New Hardware for the 40m IFO Upgrade

We contributed to the hardware efforts for the upgraded 40m by participating in 40m planning and status meetings and by helping to make measurements of seismic noise at the 40m site.

Correlation of Super-Kamiokande supernova and cosmological neutrinos with LIGO

We worked with Szabolcs Marka of the Caltech LIGO laboratory to assemble a plan for LIGO to join a network of neutrino detectors called the supernova early warning system (SNEWS). Our plan includes the ability to formulate an on-line gravity-wave supernova triggers and to be sent to SNEWS. Our plan also includes the ability to receive supernova triggers from SNEWS. Our efforts are outlined in a draft document (LIGO-U000004-00-Z) entitled," Entry of LIGO into the Supernova Nova Early Warning System (SNEWS) And Initiative for Additional Cooperative Agreements With Cosmic Ray Neutrino and Electromagnetic Observatories." The authors of this document are Kenneth S. Ganezer (CSUDH) and Szabolcs Márka (CalTech). We took a first look into the question of optimizing pointing to a galactic supernova using low-energy neutrinos from Super-Kamiokande and other similar detectors. There have been several recent articles concerning this topic by Beacom and Vogel.