LSC Six-Month Progress Report

Organization University of Texas at Brownsville Relativity Group (UTBRG) **LIGO-M000041-00-M**

Report Date 02/15/2000

Attachment A - LIGO I

Participation Joseph D. Romano: 100%
Mario Diaz: 100%

Item - Task 8 - a.

In work that has not yet been published, J. Romano and L.S. Finn have shown that the performance of the cross-correlation (CC) and maximum-likelihood (ML) statistics for stochastic background searches depends on how well one can estimate the detector noise in advance. For some simple model problems involving uncorrelated, Gaussian, stationary noise in two detectors, the ML statistic is preferred if the error in the estimate of the auto-correlated detector noise is much less than the stochastic background signal strength. If, however, the error in the estimate of the noise is on order or greater than the stochastic background signal strength, the CC statistic is preferred. A draft of a paper describing these results has been completed. In addition, a draft of a paper describing how a network of detectors can be used to detect a stochastic background of gravitational radiation has also been written. We hope to finalize these drafts and submit the papers to Physical Review D during the next six month work period.

Item - Task 8 - b.

B. Allen and E. Flanagan have succeeded to generalize an expression for a robust version of the cross-correlation statistic to colored, non-Gaussian noise in physically separated detectors. A draft of a paper describing this work has been completed. J. Romano did not contribute to this part of the project. More details regarding the robust statistic for stochastic background searches can be found in the MOU reports from the Cornell and/or UW Milwaukee groups.

Item - Task 8 - c.

In collaboration with J. Romano, M. Diaz and students at UT Brownsville have just begun to write code for the stochastic background section of the LIGO/LSC Numerical Algorithms Library. Code to calculate the values of the overlap reduction function between two interferometer sites has been written and is part of the most recent release of the numerical algorithms library. Additional code to calculate the cross-correlation statistic and to simulate various

types of stochastic background signals and detector noise is currently being developed. UTB is being helped by LSC members from Cornell University and the Albert Einstein Institute in Potsdam, Germany in this task.

Item - Task 8 - Extra Item: 1.

In September 1999, UTB was awarded a 3-year NSF grant to work in collaboration with the LIGO Lab on issues related to gravitational wave data analysis. A large amount of time was spent during the fall semester teaching undergraduate students C programming and the LIGO/LSC Numerical Algorithms Library (LAL) standard. These students should be able to help out with LAL coding during the next six month work period.

Item - Task 8 - Extra Item: 2.

In December 1999, J. Romano was asked by the LIGO Lab to aid in the development and coding of the Data Conditioning component of the LIGO Data Analysis System. J. Romano has been assigned the task of implementing the Summary Statistics Engine. Prototype code to calculate descriptive statistics for an array of data (e.g., min, max, mean, rms, ...) has been written. L.S. Finn (from Penn State) and P. Charlton and S. Scott (from Australian National University) are also participating in this project.