

WSU RELATIVITY GROUP'S PROPOSAL
FOR JOINING THE LSC

by

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BACKGROUND

The University

1. Founded in 1890. Over 18k students.
2. Closest major university to LHO

The Physics Department at WSU

1. Faculty of 20 (2 in Astronomy)
2. 2 centers of inter-disciplinary research:
(a) Center for Material Research, (b) Institute for Shock Physics
3. ~40 graduate students

WSU Relativity Group

Sukanta Bose (professor): GW detection (inspiral, stochastic), cosmology, relativistic astrophysics, QFT on curved space

Guy Worthey (professor) Stellar evolution, Stellar populations, Off-center SN explosions, GW burst and inspiral sources

Shawn Seader (grad student) Hierarchical coherent-network inspiral search code

J. Koski & S. Sorensen (undergrad students): GW data-analysis; mini-Beowulf

WSURG's Resources:

Hardware: 2 Sun workstations, 4 Linux boxes, several PCs, and a mini-beowulf on anvil

Software: Matlab, Mathematica, LAL, ...

Grants: NASA (Worthey); WSU has already committed matching funds for a post-doctoral researcher in LIGO-related work. Application for NSF grants on the basis of the collaboration

Growth possibilities: Department is expanding – hiring this fall an astronomy/astrophysics instructor

Collaborations

1. **IUCAA, India:** S. V. Dhurandhar & A. Pai (since 1997)
2. **Perth, Australia:** David Blair & Michael Tobar (since 1999)
3. **Cardiff, U.K.:** L. P. Grishchuk, B. S. Sathyaprakash (since 1999)
4. **AEI, Germany:** B. F. Schutz (since 2000)
5. **LSC:** through Upper Limit groups (since 2000)

LIGO-related Past Work

1. **Coherent network searches** for inspiral signals (Dhurandhar, Pai, SB):

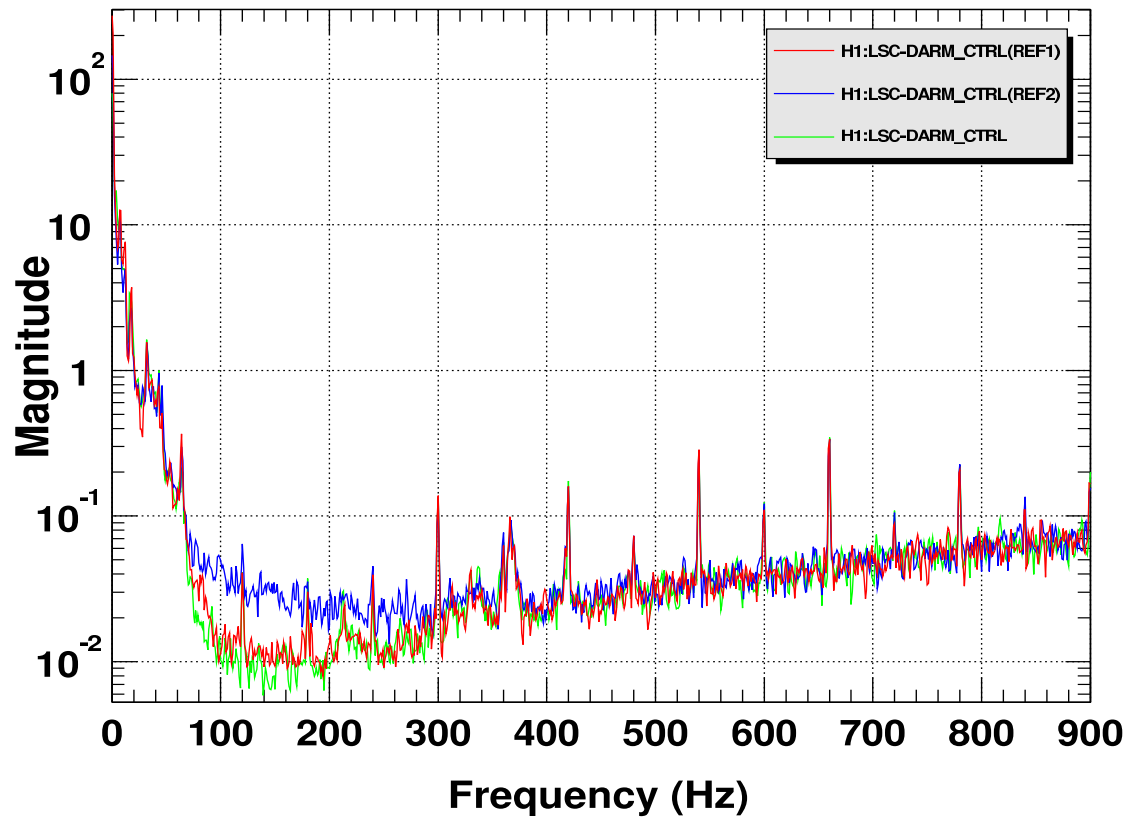
Network-detection statistic for groups of arbitrarily located/oriented interferometers; metric on source-parameter space accessible to networks (involving LLO, LHO, VIRGO, ...); Wrote LAL code for a 2-detector search.

2. **Robust and coherent network strategy** for searches in non-Gaussian noise (SB)

3. **Stochastic Background simulation** (Allen, Whelan, SB):

Wrote LAL code for simulating a stochastic GW background in a pair of interferometers. Successfully injected (with Shawhan) simulated signals in hardware in H1 and LLO during E7.

Power spectrum



***T0=06/01/2002 00:28:59 *Avg=1**

BW=1.5

Fig. H1 power spectra **before** (red), **during** (blue), and **after** (green) the injection of a simulated stochastic background signal.

LIGO-related Current and Future Work

1. Test LAL code for multiple-interferometer searches of inspirals: Required in the upper-limit analysis by the IUL group (SB)
2. Monte Carlo simulations using the LAL-SimulateSB code: Required in the upper-limit analysis by the SSUL (SB)
3. Hierarchical methods on coherent network-searches of signals from deterministic sources (SB)
4. Data-analysis and coding aspects of hierarchical methods for network searches (Seader)
5. Work on modelling the distribution of GW burst sources (including SNs, GRBs, ...) (Worthey)