

Thoughts on process for approving a detection claim
PRS 13 March 2004

After reviewers approve, they should join Detection Committee (and UL Chairs) for a second review. Nature of review is to check that all “scientific checks” have been done properly, and give answers that strongly point to detection. We want to be sure beyond a reasonable doubt that the claim is correct. Our ideal is a “gold plated” signature.

Scientific checks:

1. correctness of software
2. statistical confidence
3. understanding of the instruments
4. ability to rule out non-GW explanations
5. cleanliness of data and signatures
6. use of follow-up LSC gravitational wave observations
7. connection with astrophysical theory
8. (checks with other gravitational wave detectors, and other astronomical observations)

Detection Committee approval is needed on the first seven criteria before any outside communication, and in particular before seeking “outside” GW or other astronomical data to follow up. (“Outside” means not engaged in an ongoing collaborative search for the signal class in question. So GEO is not outside on any search. On basis of present MOU, TAMA would be definitely outside for stochastic and periodic, inside on burst or inspiral.) Requests for information should be made discreetly, and without any expressed or implied belief in the reality of any signals at the time of the request. Requests for data should be broad enough so that the precise nature of candidate signals can’t be determined from the request itself. (e.g., for impulsive signals, more data than just the time of the candidate burst signals should be requested.)

We would want to ensure that instrument experts have given up on the plausibility of an instrumental explanation for the apparent signal. This may require assembling a tiger team to check for possible instrumental effects.

A detection involves different kinds of statistics than does setting an upper limit. Parameter estimation will come to the fore for the first time, so special review will be required for the correctness of any statements made about the characteristics of the signal.

Any indications of possible detections should be a regular part of communications by the Search Groups to the rest of the LSC at the data analysis sessions at LSC meetings.

Formal presentation of the case for a detection must be made at an LSC meeting, and approved by the LSC, before any announcement is made to scientists outside of the LSC. A paper should be presented to the LSC in advance for its approval. The paper is really required here, because upon approval we will need to be ready to communicate clear and

complete details to the outside world. (This does not apply to a first request for corroborating data, so long as that request can be made in a discreet way.)

Upon approval by the LSC of a detection claim, we should communicate it to our GWIC colleagues before an announcement to the general public. We need to allow sufficient time for a thoughtful response. (How long is that?)

If there are substantive comments from GWIC, the Spokesperson should ask the Search Group to address them. In particular, if there are any other relevant observations beyond those sought previously, their results need to be taken into account.

Once all comments have been addressed, a paper should be posted on gr-qc and simultaneously submitted to an appropriate letters journal for prompt publication. The author list should be the full standard LSC observational papers author list, plus the names of any other outside scientists whose contributions made a substantial impact on the paper.

We need to consider the possibility of time pressure for good scientific reasons. For example, we might receive a supernova alert or GRB alert, and the announcement of a gravitational wave detection might influence the planning of subsequent observations by outside astronomers. Could we do carry out this procedure in a rapid fashion for a first detection, or only subsequent ones?