

Attachment A
to the
Memorandum of Understanding
(LIGO-M060038-A-M, VIR-PLA-DIR-100-223)
between
VIRGO
and
LIGO
January 2007

Organization of data analysis:

Analysis groups:

Data analysis projects and activities will be organized in analysis groups, comprising members of LSC and Virgo. Any data analysis project must be affiliated with at least one of the analysis groups. Participation to these analysis groups is open to all LSC and Virgo members.

Instrument experts will be active members of any analysis group to ensure appropriate use and interpretation of the data.

The analysis groups are responsible for writing scientific papers that report the result of their analyses. The analysis groups are also responsible to put forward analyses and publications plans to the Collaborations (LSC and Virgo) to exploit the data.

It is expected that there will be several scientific topics being addressed under the umbrella of each analysis group. Nevertheless, all teams need to regularly report their progress to the rest of the analysis group, in a spirit of transparency and openness.

Each analysis group will have Chairs, responsible for overseeing that the full scientific potential of the data is exploited, that the results are correct, reproducible, reliably recorded and back-trackable and that the analysis method and technique is thoroughly documented. The Chairs will also monitor the compliance of analysis efforts with all policies and encourage that analyses are carried out by heterogeneous teams of scientists from both projects.

Leadership of the analysis groups:

Each joint Analysis Group will have two Chairs: one from Virgo and one from the LSC. The two Chairs are responsible for the overall guidance of the work of the joint Analysis Group.

A Deputy Chair may also be appointed from each Collaboration, with responsibilities specific to that Collaboration (data quality, pipelines, backlog of papers ...), with responsibilities specified when they are appointed.

From each Collaboration, either the Chair or the Deputy Chair must have sufficient instrumental expertise to take on responsibility for ensuring the correctness of judgments about vetoes and data quality and to ensure that any other kind of instrumental idiosyncrasy is taken properly into account.

The Chairs from each Collaboration will be chosen by the Collaboration's own internal procedures, while keeping informed the other collaboration of the selection process.

During a transition period the LSC and Virgo Collaborations can maintain two Chairs each, rather than a Chair and a deputy-Chair. One of the Chairs will be designated as the main liaison to the other project. The transition period is meant to allow a smooth transition between the existing structures and the new joint structures, while at the same time not affecting the scientific productivity of the groups. Such period will begin after the MOU is signed and will end at a time deemed appropriate by each analysis group but not exceeding 1.5 years. A natural time for this transition period to end is the exhaustion of the LSC-only and Virgo-only publications back-log.

Research planning:

Each analysis group will write and maintain (by yearly updates) a White Paper describing its research program. Each analysis groups will also maintain and make available to the Collaborations a more detailed description of the different efforts taking place under its umbrella, including the names of the scientists involved.

Reviews:

When an analysis is reviewed, the scientific results, the software used to produce them, the methodology of the search, any technical material documenting the analysis as well as the proposed publication itself must receive attention. In particular, the goal of the review process is to ensure:

- the correctness and meaningfulness of the reported result
- the early detection of errors
- that the results are reproducible
- that the analysis methods are well documented
- that the software is correct and well documented
- that the comments from the Collaborations have been appropriately addressed

The analysis groups and the review committee together will agree on the most effective means to ensure that these goals are met, and report to the Data Analysis Council.

Structure of the Review Committees:

The Joint Review Committee associated with each analysis group will have two Chairs, one from each collaboration, chosen not to be active members of that analysis group. Its membership will come from both collaborations; equal numbers are not required, but there should be a “critical mass” of members from each collaboration. The membership will include people with expertise in instrument science (for each detector which supplied data used in the analysis) as well as in data analysis.

Appointments of members from each collaboration will be made by that collaboration’s leadership, in consultation with the leadership of the other collaboration.

Coordination of the data analysis activities across the different analysis groups:

The chairs of the analysis groups, along with the chairs of the Review Committees associated with each analysis group, together constitute the Data Analysis Council, chaired by the Virgo and LSC Data Analysis Coordinators.

The Data Analysis Council will be responsible for coordinating and overseeing the analysis activities across the different analysis groups and for ensuring uniform and appropriate review of results and operating procedures.

The Data Analysis Council will be the venue to discuss issues of transversal interest for the different analysis groups, to address the harmonious utilization of those human and computing resources which are shared by different groups, and to agree upon the scientific prioritization of the analyses if the need arises to make choices.

The leadership of the two Collaborations may also seek advice from the Data Analysis Council on how to best support the program.

Papers, talks, other presentations

Each analysis group will present to the Collaborations a plan for the presentation of new results on the six-months to one-year time scale.¹ The plan should explain the scientific rationale behind the proposed schedule and be realistic about the manpower necessary to carry it, including the associated review work. The Collaborations will discuss these plans during the joint meetings scheduled throughout the year and approve them or propose amendments.

Approval of new observational results:

Any presentation of new results, in whatever form, must be reviewed and approved by the appropriate Review Committee. After the Review Committee has approved it, the result will be presented to the LSC and the Virgo Collaboration, for approval by each

¹ By “presentation of new results” we refer to the dissemination outside of the Collaborations of a statement derived from a new analysis of gravitational wave data. This includes both presentations at conferences and papers or notes in any journal (peer reviewed journals and not, and conference proceedings), in public archives (electronic and not) and in any publicly accessible web pages.

according to its own governance procedures. Each new result must be approved by both projects before it can be made public.

Approval of observational papers:

When it determines that an observational paper is ready for publication, the Review Committee will make a recommendation to that effect to the two Collaborations. Each will decide on approval of papers according to its own governing structures.

Approving talks:

Talks presenting new results can be presented after the material has been approved by the Review Committee and by each Collaboration, according to their own governance.

The rehearsal of a talk on new results will be held by telecon or the slides will be made available, so that members of both Collaborations can provide feedback. A version incorporating the comments will receive final approval by the competent authority of each collaboration.

Talks on previously approved results are approved by a review of slides by both collaborations. To this end, the list of talks needs to be known sufficiently in advance.

Invited talks:

Invitations received by either a member of the LSC or the Virgo Collaboration for a talk dealing with either LIGO or Virgo or GEO observations or observational results at a workshop or conference are regarded as invitations to the Collaborations. The invitation will be forwarded to a joint Publications and Presentations Committee, who will decide who should accept the invitation.

Combining author lists:

Observational results papers will be published with one single alphabetical list of authors, referred to as "The LIGO Scientific Collaboration and the Virgo Collaboration". The most appropriate way will be found to indicate to which collaboration he/she belongs.

Announcement of first detection:

The following paragraph goes into effect once full data sharing begins, and applies to a first detection of gravitational waves made with data taken after full data sharing has begun:

Announcement of the first detection of gravitational waves may be made only with approval by the LIGO Scientific Collaboration and Virgo Collaboration. Upon approval

by the two Collaborations, permission must be given by the LIGO Directorate, the GEO Principal Investigator for Data Analysis, and the Virgo Spokesperson. Any press releases announcing the first detection of gravitational waves will be issued jointly and simultaneously by the LIGO Scientific Collaboration (LIGO & GEO) and Virgo.

Other press releases:

Any press releases pertaining to gravitational wave searches or to any other collaborative work will be issued jointly and simultaneously by the LIGO Scientific Collaboration (LIGO and GEO) and the Virgo Collaboration.

Other joint coordinating committees:

A Joint Run Planning Committee will be formed, consisting of the Virgo and LSC Data Analysis Coordinators, plus relevant experts from VIRGO, GEO, and LIGO on topics such as: calibration, commissioning, computing/software, detector characterization/vetoes, detector planning, and site management. Each project will appoint its own representatives. It will have two chairs, one each appointed by the VIRGO and the LIGO leadership.

A Joint Computing and Software Committee will be formed, consisting of the leaders of computing and data analysis software efforts of VIRGO and the LSC. The Joint Computing and Software Committee will work to ensure the appropriate degree of interoperability of computers and software, and will consider questions of the total available computing power.

Joint collaboration meetings:

Once the data sharing provisions of this Memorandum of Understanding go into effect, the two collaborations will schedule a sufficient number of joint collaboration meetings to allow frequent and timely discussion of new data analysis results and to facilitate joint research in all other areas of gravitational wave detection.

The sites of the meetings will be geographically distributed, so as to fairly share the burden of travel.

Every effort will be made to facilitate fruitful participation by telephone, so that members unable to travel will be able to participate in key discussions and decisions.

In addition to this schedule of joint meetings, the projects may call additional meetings dedicated to issues more specific to one detector; these meetings would be open to the other party and scheduled so as to allow wide participation.

Between signing of MOU and start of data sharing:

During the transition period before start of data sharing, free exchange of information about analyses is strongly encouraged, but exchange of data is not to take place before the official start of data sharing. Exceptions, for exchange of short segments of data, can be approved by each Collaboration according to their governing structures. A written proposal detailing the scope and the goals of the data exchange will be required.

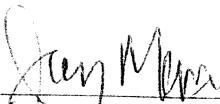
Mechanism for deciding on the transition to full data sharing

After the signing of the MOU, the Data Analysis Council will discuss the criteria by which we judge that it is time to make the transition to full data sharing. When it appears that those criteria can be met, the Data Analysis Council and the Run Planning Committee should jointly present a recommendation to that effect to the two Collaborations. Each Collaboration will consider the proposal according to its own governing structures.

Back-log of LSC-only or Virgo-only publications:

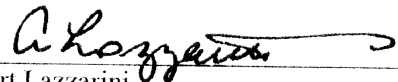
After the data sharing agreement has come into effect, there may still be LSC-only or Virgo-only publications that are not completely finalized. The provisions of this MOU do not cover work on these publications. The LSC and Virgo expect that any discussion will be open respectively to the Virgo Collaboration and the LSC, under the understanding that any information is to be considered confidential until publicly released by the party owning the data.

Approved:



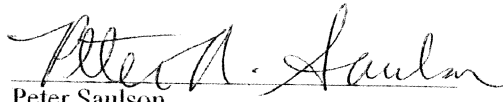
Jay Marx
LIGO Executive Director and LIGO Principal Investigator
Jan 24, 2007

Date



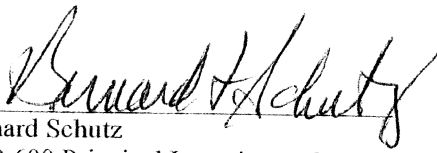
Albert Lazzarini
LIGO Laboratory Deputy Director
24 Jan 2007

Date



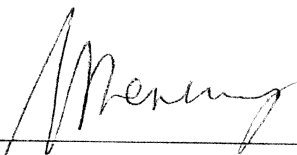
Peter Saulson
LSC Spokesperson
17 Jan 2007

Date




Bernard Schutz
GEO 600 Principal Investigator for Data Analysis
12 Feb 2007

Date



Filippo Menzinger
Director of EGO
5 March 2007

Date



Benoit Mours
Virgo Collaboration Spokesperson
15 February 2007

Date