

LIGO Use Cases for Collaboration Management Platforms (CMP)

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LIGO-xxxxxxxx-vN



LIGO Science Mission

LIGO, the Laser Interferometer Gravitational-wave Observatory, seeks to detect gravitational waves – ripples in the fabric of spacetime. First predicted by Einstein in his theory of general relativity, gravitational waves are produced by exotic events involving black holes, neutron stars and objects perhaps not yet discovered.

Laser Interferometer Gravitational-Wave Observatory

Who we are...

('cause it's complicated and puts demands on our tools)

LIGO Hanford, WA



LIGO Hanford, WA



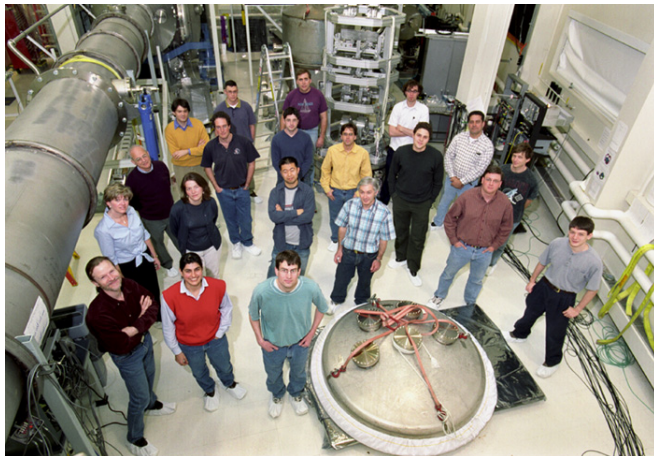
LIGO Livingston, LA



LIGO Livingston, LA







LIGO Laboratory =
LIGO Caltech + LIGO MIT +
LIGO Hanford Observatory +
LIGO Livingston Observatory

LIGO Scientific Collaboration

The LIGO Scientific Collaboration (LSC) is a self-governing collaboration seeking to detect gravitational waves, use them to explore the fundamental physics of gravity, and develop gravitational wave observations as a tool of astronomical discovery. The LIGO Scientific Collaboration was founded in 1997 and currently has nearly 800 members from 70 institutions worldwide.

LIGO LIGO Scientific Collaboration LSC



LIGO Laboratory and the LSC

Some, *but not all*, members of the LIGO Lab
are members of the LSC

“Groups” join the LSC

(some groups more structured than others)

GEO600 interferometer, Hannover, Germany



GEO600 Members



- ▶ Gravitational Physics Group, University of Birmingham
- ▶ Gravitational Physics Group, Cardiff University
- ▶ Institute for Gravitational Research, University of Glasgow
- ▶ Max-Planck-Institut für Gravitationsphysik (Albert-Einstein-Institut), Potsdam
- ▶ Max-Planck-Institut für Gravitationsphysik, (Albert-Einstein-Institut), Hannover

All members of the GEO600 project are members of the LSC

On the other end of the spectrum...

CalState Fullerton LSC Group



(Josh)

LSC or LIGO?

Internally and almost always when presenting
our external face we simply call ourselves

“LIGO”

GW community is larger than LIGO...

Virgo interferometer, Cascina, Italy



Virgo and the LSC

Virgo members are *not* members of the LSC

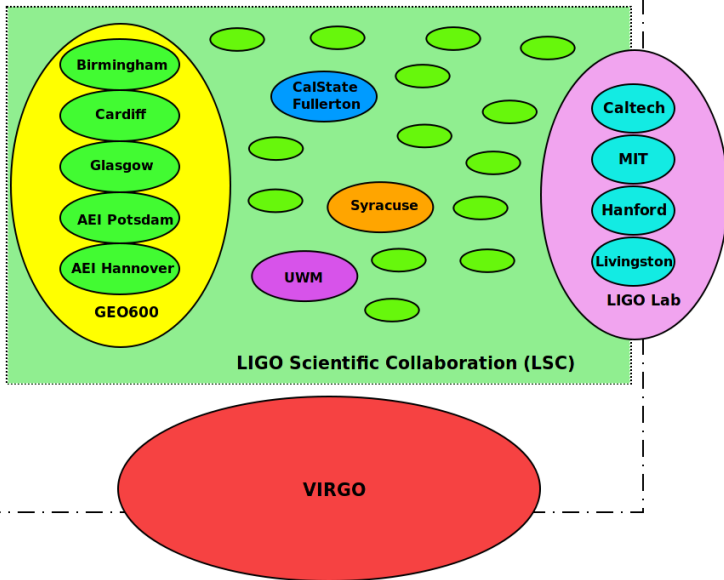
Virgo and the LSC

Virgo and LIGO...

- ▶ share access to data
- ▶ share access to computing resources

Joint body is “LIGO/Virgo Community” or LVC

LIGO/Virgo Community (LVC)



Netherlands Connection



Major contributions by NIKHEF to community

- ▶ Substantial contribution to Virgo instrument
 - ▶ Input mode cleaner
 - ▶ Phase camera
 - ▶ Cryogenic links
 - ▶ External benches
 - ▶ Linear alignment
 - ▶ Electronics
- ▶ NIKHEF GW group is member of Virgo collaboration
- ▶ Strong theory group (extreme mass ratio inspirals)
- ▶ Design of next generation instruments (Einstein Telescope)
- ▶ Data analysis
 - ▶ Dr. Chris Van Den Broeck (former LSC member)

LIGO and the Astronomy/Astrophysic Communities

LIGO has signed MOUs with a number of projects

- ▶ exchange “triggers” (events)
- ▶ some telescopes slew in response to LIGO triggers

The gravitational wave window on our universe is just beginning to be revealed...

Netherlands Connection



LOW Frequency ARray (LOFAR)

- ▶ many low-cost antennas
- ▶ Low Band Antenna (LBA) between 10 and 90 MHz
- ▶ High Band Antenna (HBA) between 110 and 250 MHz
- ▶ Currently 36 stations are being constructed in the Netherlands
- ▶ Distributed over area 100 Km in diameter
- ▶ Several international stations are to be built
- ▶ Half in Netherlands located in a 2x3 Km core area

LIGO and LOFAR

LIGO and LOFAR have signed a MOU (and Virgo!)

LIGO contact is Dr. Ed Daw, Senior Lecturer, U. of Sheffield

Collaboration work is just beginning...

Now is the time to deploy federated collaboration tools for use by LIGO and LOFAR

How Will LIGO use CMPs?

To organize ourselves...

- ▶ LIGO Lab is a federation of CIT, MIT, LHO, LLO
- ▶ LSC is a federation of Lab and many groups
- ▶ GEO is federation wholly consumed by LSC

Current “MyLIGO” tool evolve to thin layer over COmanage

How Will LIGO use CMPs?

To collaborate with GW community...

- ▶ Right now Virgo members issued LIGO identities
- ▶ Virgo and LIGO federate through InCommon, Fédération Éducation-Recherche, IDEM, SURFnet(?)
- ▶ LCGT project in Japan (GakuNin?)

Need “neutral” collaborative workspaces built on CMP

(See SURFnet “circle of pain” document)

(“Coopertition” ala Ken Klingenstein)

How Will LIGO use CMPs?

To collaborate with astronomy/astrophysics communities...

- ▶ LIGO/LOFAR is just a start...
- ▶ Opportunities CMP to enable many joint projects

(Somewhat easier because of less “coopertition”)