THE GRAVITATIONAL VOICE

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News from EGO and VIRGO

Toasting the locking of the interferometer

The newly-elected LIGO (David Shoemaker, left) and VIRGO (Jo van den Brand, right) spokespersons are celebrating the third detection GW170104

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The content of this newsletter does not necessarily represent the opinion of the management.

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EDITORIAL

Writing this editorial I feel as though we are in an eventful time: we are (or we hope to be) close to the beginning of a data-taking period with three working detectors; we published, a few days ago, a new clear signal of gravitational waves, detected by the American interferometers. The activity of the commissioners of Advanced Virgo is becoming more intense and harder every day. As a consequence the sensitivity is becoming better and better.

Virgo has a new spokesman, Jo van den Brand, since a few weeks. We welcome him and encourage him to lead the collaboration to the due success. Jo took over the role from Fulvio Ricci, to whom we are really grateful for several years of work.

We are really happy to start h33 by publishing the text released to the press to announce the new discovery.

These few lines may be felt to be too optimistic, but I believe that we will not be deceived, thanks to the efforts we are making.

But there is something more: just a few days before the publishing of h33, we learned that a British colleague of ours has gained Italian citizenship; this is really great: welcome Gary!!!

C.Bradaschia
Chief Editor

GW170104

It is really a pleasure to open this new issue of the h newsletter with the "Fact Sheet" summarising the astonishing parameters characterising a new amazing event. It is the third coalescence of a "BBH - Black Hole Binary" detected by the two LIGO interferometers on January 4th 2017.

GW170104: FACTSHEET

Background Images: time-frequency trace (top), H1 and L1 time series and maximum-likelihood binary black hole model (middle top), residuals between data and best-fit model (middle bottom), reconstructed waveforms from wavelet and binary black hole analyses (bottom)

observed by	LIGO L1, H1
source type	black hole (BH) binary
date	04 Jan 2017
time	10:11:58.6 UTC
signal-to-noise ratio	13
false alarm rate	< 1 in 70,000 years
probability of astrophysical origin	> 0.99997
distance	1.6 to 4.3 billion light-years
redshift	0.10 to 0.25
total mass	46 to 57 $M_\odot$
primary BH mass	25 to 40 $M_\odot$
secondary BH mass	13 to 25 $M_\odot$
mass ratio	0.36 to 0.94
remnant BH mass	44 to 54 $M_\odot$
remnant BH spin	0.39 to 0.7
remnant size (effective radius)	123 to 150 km
remnant area	1.9 to 2.8 x 10^5 km^2
effective spin parameter	-0.42 to 0.09
effective precession spin parameter	unconstrained
duration from 30 Hz	~ 0.25 to 0.31 s
# of cycles from 30 Hz	~ 14 to 16
signal arrival time delay	arrived at H1 3 ms before L1
credible region sky area	1200 sq. deg.
peak GW strain	~ 5 x 10^{-22}
peak displacement of interferometer arm	~ ± 1 am
frequency at peak GW strain	160 to 199 Hz
wavelength at peak GW strain	1510 to 1880 km
peak GW luminosity	1.8 to 3.8 x 10^{56} erg s^{-1}
radiated GW energy	1.3 to 2.6 $M_\odot$
remnant ringdown freq.	297 to 373 Hz
remnant damping time	2.5 to 3.2 ms
consistent with general relativity?	passes all tests performed
graviton mass combined bound	≤ 7.7 x 10^{-23} eV/c^2
evidence for dispersion of GWs	none

Parameter ranges correspond to 90% credible intervals.

Acronyms:

L1/H1=LIGO Livingston/Hanford, am=attometer=10^{-18} m, $M_\odot$=1 solar mass=2 x 10^{30} kg

One more fusion of two black holes

The gravitational waves travelled for about 3 billion years to reach the earth.

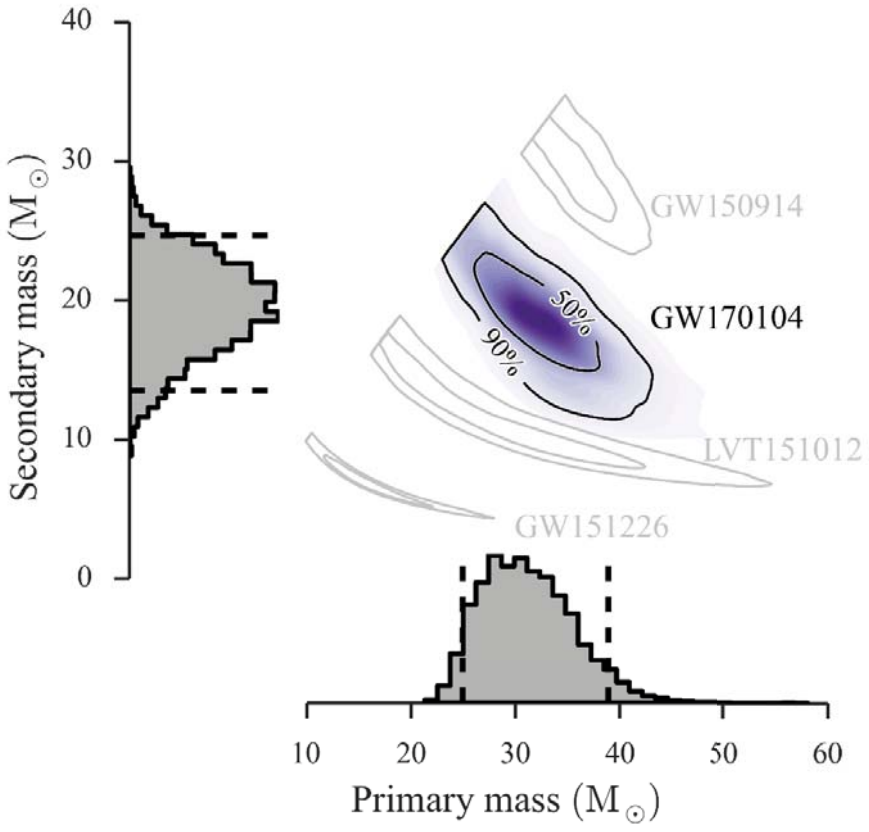
The signal was observed on January 4th, 2017, when the LIGO observatory was just resuming full operation after the end of the year break for planned maintenance.
Not everything was smoothly working yet, and the fully automated analyses intended to provide a rapid alert were still idle, waiting for the LIGO Hanford data to get qualified as well calibrated.
Nevertheless, the usual human inspection of the fresh results from the LIGO Livingston detector unveiled an interesting signal, similar to the previously detected gravitational waves, and triggered a complete analysis and deeper checks about the quality of the acquired data.
About 6 and a half hours after the gravitational wave passage at earth, LIGO and Virgo collaboration were able to alert astronomical partners for follow-up studies, providing preliminary information on the source characteristics and its approximate location in the sky. These intense first hours were then followed by almost five months of dedicated work, to ensure that we had full understanding of the detectors and to analyse and validate the interpretation of this event.
At last, on June 1st, the release of the publication by LIGO-Virgo Collaboration on Physical Review Letters on-line [PRL 118, 221101 (2017)].

This detection, named GW170104, shares the high confidence of the previous two, GW150914 and GW151226, and brings a very important confirmation of the existence of a population of binary black holes which extends to mass values higher than what previously known with electromagnetic observations.
In fact, the main characteristics of the black hole merger GW170104 are similar to the ones of GW150914, the first detected. In particular, its progenitors are about 31 and 19 solar masses (compared with the 36 and 29 solar masses of GW150914, and in the process about 2 solar masses were converted in gravitational radiation (compared to 3 solar masses in the case of GW150914).
These detections, together with the weaker candidate LVT151012, make up our precious catalog of binary black hole mergers, which will be extended as the observations continue.

One special characteristic of GW170104 is its larger distance from earth, about 3 billion light years, around twice the distance of GW150914. On one hand, this made the signal weaker and more difficult to detect and to interpret, but on the other hand it offered an opportunity to better test how gravitational waves propagate on a longer distance. As a result, this event allowed to further improve our verifications of Einstein's General Relativity.

The upcoming observations of LIGO and Virgo detectors, expected for this summer, will provide a crucial opportunity to improve the localization in the sky of gravitational wave sources. Moreover, in case of black hole or neutron star mergers, the three detectors will make possible to improve our uncertainties on crucial characteristics of the source, as its distance and orbital orientation, making our future source catalog more and more informative.

G.Prodi



Advanced Virgo Dedication Day - 20th of February 2017

The European gravitational interferometer VIRGO, on the road again

On Monday the 20th of February, the ceremony of dedication of Advanced Virgo, the second-generation European gravitational interferometer, was held at the European Gravitational Observatory (EGO), the site at which Advanced Virgo is located.
The ceremony took place in the presence of the presidents of the institutions that have funded the project (INFN, IN2P3, Nikhef) and of representatives of the governments of the six nations whose laboratories are members of the Virgo Collaboration. and even of the Virgo interferometer, was the key to the success, together with many amateurs eager to talk about their science.

The procedure to lock the interferometer, implemented successfully in real time in front of those in attendance at the ceremony, showed how the commissioning of the machine is already well advanced.

After five years of hard work, which has aimed to modify the optical system by introducing heavier and higher-quality mirrors, to improve the input laser and increase its power, to upgrade the detection device, to introduce a sophisticated system to mitigate potential aberrations, to improve the super-attenuators that handle seismic isolation, to introduce a diffused-light absorption system, to reach an even more extreme ultra-high vacuum, Advanced Virgo began the complex phase of commissioning in order to achieve a sensitivity suitable to jointly-operate alongside Advanced LIGO and to open the road for systematic astrophysics via gravitational waves.

The first and more demanding phase of the process, leading, probably by 2020, to an increase in sensitivity by a factor of ten of the LIGO and VIRGO large interferometers, is concluded.
By that time, the volume of the universe open to exploration with the instruments will be larger by a factor of one thousand with respect to the first generation instruments.

In the period 2011-2017, the physics of gravitational waves has undergone an impressive acceleration: full establishment of the LIGO-VIRGO global collaboration; achievement of the upgrade to second-generation interferometers; first detection of gravitational waves. Soon, VIRGO will also be operative.
We await, alongside our LIGO colleagues, the conclusion of the commissioning of our interferometer: three detectors are essential to be able to proceed toward really substantial scientific programs.
The identification of the transit of gravitational waves through the three interferometers, in addition to the reinforcement of the significance of the scientific information due to the structural differences in the typologies of LIGO and VIRGO, will also allow to improve the localization of the astronomical sources of the signals – reducing by a factor of one hundred the size of the window in the sky – making a real multi-messenger analysis possible, thanks to almost-real-time alerts sent from the interferometers to other astronomical instrumentations.

VIRGO will become operative as the third pillar of gravitational-wave science, after having contributed with the ideas and technologies already adopted in the first generation, to crucially mark the progress toward the successful second generation; indeed, the determination of Adalberto Giazotto to improve the sensitivity of interferometers in the low-frequency region (below 100 Hz) proved essential to the first two detections of signals generated by binary black hole systems, and we hope, soon to detect binary neutron star or neutron star-black hole systems.

The addresses by D. Reitze, Executive Director of LIGO, M. Ohashi, Director of the KAGRA Observatory, K. Danzmann, Consortium lead of LISA, and S. Rowan, Chair of the Gravitational Waves International Committee, concluded the dedication ceremony by bringing a positive, confident and promising message from the major international partners and from the global community, which looks at Cascina with attention and enthusiasm.

As Director of EGO in this period I cannot be more satisfied: almost all the objectives of my mandate have been accomplished; now it is only left to detect a gravitational wave signal with our instrument, together with our LIGO friends in the next few months.

I take the opportunity to recognize the great engagement of Virgo members and EGO staff in this complex phase: without the participation of all of them the objectives could not be achieved!

F. Ferrini

Commissioning progress

Since I joined the Virgo collaboration, back into 2006, I spent quite some time doing commissioning, mostly for the TCS.

Being a commissioner for a particular subsystem is exciting (and sometimes also frustrating), but, nevertheless, one has the possibility to see things moving on.

When I was appointed commissioning coordinator, I feared that the fun was over, being too busy in doing planning, filling up documents and attending meetings and telecons. I soon realized that, fortunately, this was not the case (almost). What really has changed is the perspective: now I do not have the limited view of a single subsystem, but I can look at commissioning through a wide-angle objective. I can look at the progress of the different parts, coming along together and merging into a single powerful detector.
Moreover, I get in contact with many members of our collaboration and have the pleasure of appreciating the professionalism and the quality of the people on site and distributed in our labs.

We can say for sure that, since November, when the last big hardware intervention ended, the commissioning of Advanced Virgo has made significant progress. We always say that this activity makes big jumps, rather than following a smooth curve. Indeed, I think we can easily identify some key moments in the recent history that made the difference. For instance, a big achievement was locking the interferometer in recombined mode at half fringe, which happened right at the end of last year, on December 30th. But the real turning point was when the detector acquired the lock in recycled configuration at dark fringe for the first time, even if it lasted only for a few minutes, at the end of February.
Given the optical configuration of Advanced Virgo, this achievement is really remarkable, since the interferometer was locked using the 6 MHz sidebands that, by design, are so sensitive to any aberration that few believed that this was possible.
Since then, the locking strategy has been improved and, together with the progress of other subsystems, the interferometer hit a very important project milestone: one hour lock at dark fringe in recycled configuration. This is the moment when the paradigm of commissioning has changed: from struggling for stability to digging into noise for sensitivity.

Nowadays, the locks last for several hours and it is possible to switch automatically to DC readout. The reliability of the interferometer is also shown by the fact that, during the first weekend of May, thanks to the valuable support of the EGO operators, it was possible to successfully complete the first Advanced Virgo commissioning run (C8).
In my personal opinion, the most relevant outcome of C8 is not the duty cycle around 85% or the binary neutron star range of the order of a few megaparsecs, but rather, the fact that the production of "science data" restarted after more than five years. We're not yet there, there is a lot of work still to be done to join O2 and the available time is disappearing quite quickly. However, today we can look to tomorrow with more confidence.

When I try to explain to my students what commissioning means, I compare it to the tuning of a MotoGP bike. Like our detector, all the parts of these bikes are carefully designed, separately tested and then assembled together. The next phase is to get on the track and check the performances of our bike. We can then say that locking at dark fringe is like turning on the engine. Now, we're stably on track, improving our time at every lap. We're behind and we still need to finalize our bike, but we're quickly catching up!

A.Rocchi

Apollo 16 astronaut at Virgo

Charles Duke is one of the very few men (a dozen) to have walked on the Moon. And only half of them are still alive.

What impressed me most during the short visit he paid to us, was his reply when asked about his emotions during the Moon exploration mission.
He replied mentioning God and the wonder of creation. God?

C. Duke & F. Carbognani

What has God to do with one of the peaks of human science and technological achievements?

Maybe a lot. Indeed, most of the astronauts speak of their looking at the Earth from outer space as a mystic experience, while massively confronted with the beauty of the cosmos. The same kind of beauty we experienced in our community when, after a long time, the signals imagined by a brilliant mind matched experimental evidence.

But all of this may be just, again, the byproduct of the arrogance and self pride of humankind. Orphans of a planet at the centre of the Solar System and of a Solar System at the center of the Universe; lost on the periphery of

an average galaxy, we want to regain our centrality by claiming some sort of relationship with a supernatural being that all-dominates.

But this time we may be right, in the sense that there is something that brings us back to the center of the known Universe, we are the climax of Intelligent Life evolution.

And what is the role of human space exploration confronted with Intelligent Life?

Astronauts are, in their essence, agents of Intelligent Life for conquering the ultimate ecological niche, space, with almost infinite resources to be exploited. Similarly to the early amphibians moving from water to land.

So Intelligent Life will be grateful to you Charles, or better, since Intelligent Life will engulf the whole Universe, transcend space and time and ultimately become God, God is already grateful to you.

Or more trivially, thanks a lot Charles for visiting us. Take care.

F. Carbognani

CNRS/INFN safety meeting at EGO

A special meeting:

in my capacity as EGO Safety&-Security Officer, it was an honour and a real pleasure to have on site both the CNRS and INFN National Coordinators for Health, Safety and Radioprotection during the 30 May - 01 June period.

During these three days, after appropriate presentations by each service about the way the aforementioned matters are approached in their respective research centers, the exchanges between the two Institutions revolved around the organisational ground, as the numbers at stake are huge.

Just to give you an idea, *Le Service de Coordination Nationale de Prévention et Sécurité du CNRS* has to manage the health and safety of about 32,000 employees, distributed among around 1000 research units (source: http://www.cnrs.fr/fr/organisme/chiffrescles.htm), the expertise of INFN experts qualified in radioprotection is required not only at the national labs, but also abroad wherever the personnel of the Agency are present.
Their French counterparts have to deal with very stringent regulations for their basic nuclear installations and installations classified for environmental protection, the INFN Gran Sasso laboratory is the largest underground particle physics laboratory in the world and receives about 950 scientists from 32 different countries (source: https://www.lngs.infn.it/en/lngs-overview) … You will agree with me that at this level, there is no room for amateurism.
Beyond the obvious added-value of such meetings: let's say exchanges of good practices and so on, I have to say that we had a very good time. I especially appreciated the wittiness of the participants and the joyous and relaxed atmosphere: there is no doubt that we will meet again!

Secondarily, I hope the funding Institutions, through their national coordinators, appreciated the attention paid, at the European Gravitational Observatory, to security, health and safety.

Hereunder a photo of the participants close to one of the 3 km long vacuum tubes.

Janine Wibier (CNRS), Roberto Tartaglia (INFN),
Cyril Thieffry (CNRS), Yves Fenech (CNRS), Adolfo Esposito (INFN)

Frédéric-M. Richard (EGO), Enrico Bonanno (INFN), Carlo Fabozzi (EGO)

EGO Security News

A special prize:
It is with great pleasure that we have discovered that the Cascina Police ('Carabinieri') Station Commander, Lieutenant Mauro Dal Canto, has received recognition for the excellent work performed by both himself and his team, during an annual celebration of the Carabinieri Corps in Rome.
The event, which took place on the 5th of June and was held in the presence of the highest authorities of State, saw the Lieutenant and his team receive one of just five distinctions awarded. The award is particularly impressive when considered that they were chosen from more than 4,500 units across the country.

Source: http://iltirreno.gelocal.it/pontedera/cronaca/2017/06/03/news/il-miglior-comandante-di-stazione-dell-arma-lavora-a-cascina-1.15437975

A warm thank you to all of them for the attention they have continuously paid to our site over the last 15 years; of course, also without forgetting that the patron of the Carabinieri Corps, is the Virgo Fidelis.

A focus on fire hazards:
Over the period of the 6th and 8th of June, we had to call firefighters to extinguish flames in very close vicinity to the EGO site on four separate occasions. It seems safe to assume that the fires were started deliberately.
Our site is vast, so detecting the beginnings of a fire is not such an obvious task, but, thanks to the descriptions made by our external security personnel on site and the interventions of members of the EGO first-aid team, firefighters succeeded each time in controlling the flames and fumes that could have deteriorated the air filters of our experimental buildings, making them ineffective.

F-M.Richard

7-June: A fire during a windy day, approaching the EGO main entrance

Handing over the reins

During the last three years the collaboration has made a great effort and achieved an important goal: the long construction and integration phase of Advanced Virgo was finally concluded a few months ago. We celebrated the event during the dedication day.

The stress has been enormous. We had to overcome difficulties and unforeseen disasters in the construction phase. However, our compactness and determination have been the values that have permitted us to bring the integration of advanced Virgo to its conclusion. Let me stress that we started the upgrade of our machine two years after LIGO. At present, the laser light is circulating in the interferometer, assembled in the new configuration: Advanced Virgo is a reality. The new detector is in the commissioning phase, we are progressing fast and the time of the science run is approaching.

The C8 commissioning run, mainly focused on checking the detector stability, was done during the long weekend of the 1st of May. We had a very good result: more than 84% duty cycle with the interferometer in Science mode is a great success. We can even detect coalescent GW events at a distance well beyond our galaxy and we know that we can do much better.

We need an extra effort to start the data-taking and to join LIGO during the final phase of O2. We are not far from this goal and we will take advantage of our strength and competence to achieve this goal, while, in parallel, we have started to prepare for the O3 run.

I like to say that we crossed the desert, represented by the absence of scientific results produced by our apparatus. During this long journey our collaboration has changed significantly.
The integration of the Virgo data

analysis groups with the LSC colleagues has increased. On several subjects it is more and more difficult to disentangle Virgo and LSC contributions and we had the chance to contribute significantly to the first GW detection.
New colleagues joined us, adding extra expertise and value to our cultural environment. The time elapsed was hard, but Virgo's collaboration overcame it, grew in number and quality. The new groups from other European countries joining us, brought other skills and enriched our collaboration. In this way Virgo will progress further, playing a crucial role in the construction of the future of the search for Gravitational Waves in Europe.

F.Ricci

A view of the beautiful Caltec campus

March 2017 LVC meeting

This spring LIGO - VIRGO collaboration meeting (LVC) was held between the 13th and 16th of March at the Hilton Hotel of Pasadena, CA (USA). Participation was extremely high (with about 350 attendees) including VIRGO and LIGO spokespersons (F. Ricci, G. Gonzales), both at the end of their tenure, and the LIGO executive director (D. Reitze).

The venue was located in the beautiful town of Pasadena, part of the Los Angeles metropolitan area and home of the California Institute of Technology (see pictures). The weather was surprisingly warm with summer-like temperatures.

As usual, a huge number of themes were discussed: squeezing, optics, suspensions, control.

Squeezing in advanced detectors is now a reality: a squeezer is being tested at MIT [1] and will be installed at LIGO Livingston (LLO) after the O2 run, improving its high-frequency sensitivity by a factor sqrt(2).

Several results on high power laser research were shown: while a 70 W laser amplifying stage is working at LLO, an amplifier for AdVirgo, able to increase input power from 20 W to 104 W, is being tested at the Albert Einstein Institute in Hannover, showing promising results [2].
New master oscillators for future interferometers, cryogenically cooled and with longer wavelengths (2000 nm) with respect to the standard 1064 nm, are being developed [3].

The Beckman Auditorium, one of the symbols of Caltech

In the suspension field, several research activities are dedicated to the crackling noise of maraging steel blades [4, 5]. The contribution of the rotation sensor, developed by the University of Washington, to the robustness of LIGO Hanford [6] has been decisive for the high duty cycle obtained so far in O2. A lot of work is also being done for the cryogenic test mass system required by Voyager [7], the third generation detector, and for a new kind of silica fibers with a smaller diameter (10 micron) and higher stress resistance (800 MPa) [8].

Control systems had both a dedicated section and a workshop the following day after the meeting: several improvements to global and suspension control strategies used in AdLIGO and AdVirgo were discussed [9, 10, 11].

In parallel to the instrumental ones, a long session together with a workshop on Saturday, were dedicated to data analysis [12].

The meeting was also an opportunity for the spokespersons to end their mandate and say goodbye.
A long applause and standing-ovation were dedicated to both. The first detection was an event of enormous importance for the field but also a secret that had to remain hidden for several months.
The way in which the spokespersons handled that difficult task, directing a collaboration of more than 1000 people, is surely noteworthy.

Finally, a very touching talk (unfortunately not in DCC) was given by Jorge Moreno, an assistant professor of astrophysics at Cal Poly Pomona, a university of the LA metro area. He described his teaching activities with students of minority groups typically unrepresented in science. He talked about his students with great enthusiasm. These experiences showed the essence of outreach: improving people's lives using science education.

The outside of the Griffith Observatory

Inside the Griffith Observatory

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[3] P. Veitch, Plans for 2um laser development at Adelaide for next-generation GWI
[4] X. Ni, Status of the Crackle Experiment
[5] G. O'Dea, Search for avalanches of entangled dislocations as a source of dissipation and mechanical noise
[6] K. Venkateswara, Update on Beam Rotation Sensors
[7] B. Shapiro, LIGO Voyager Cryogenics at Stanford
[8] G. Hammond et al., Suspension activities in Glasgow
[9] R. Adhikari et al., Global

Controls Length to Angle Decoupling
[10] B. Lantz, Seismic Controls Update
[11] V. Boschi, L. Trozzo, LQG Control of AdVIRGO IP
[12] S. Gaudio, Can we claim a detection with one interferometer?

V.Boschi

A pint of Science

Over the period of three days in May, from the 15th to the 17th, something unusual happened in two pubs in Pisa: "L'Orzo* Bruno" and "Volta Pagina". Every evening, at 7 pm, the customers had the chance to meet one or more scientists, to learn about their most up-to-date research and ask questions about it, facilitated by one or more pints. Maybe you read an e-mail of mine or you saw a poster advertising these events organized by the international association "Pint of Science" (https://pintofscience.it/events/pisa). It was an unexpected success.
I wisely arrived at Orzo Bruno 15 minutes in advance and I got a stool, maybe the last free one.
I was there for the first two days and I really enjoyed the events, in particular the second one, about gravitational waves. The credit for this goes to Walter del Pozzo, who popularized such a hard subject with incredible effectiveness and rigor. The follow-up questions were innumerable.
Here follows some information about Pint of Science, reprinted from the official web site, which I suggest visiting.
Pint of Science is a non-profit organisation that brings some of the most brilliant scientists to your local pub to discuss their latest research and findings with you. You don't need any prior knowledge, and this is your chance to meet the people responsible for the future of science (and have a pint with them). Our festival runs over a few days in May every year, but we occasionally run events during other months. Sign up to our mailing list to be the first to hear about our latest news.
In 2012 Dr Michael Motskin and Dr Praveen Paul were two research scientists at Imperial College London. They started and organised an event called 'Meet the Researchers'. It brought people affected by Parkinson's, Alzheimer's, motor neurone disease and multiple sclerosis into their labs to show them the kind of research they do. It was inspirational for both visitors and researchers. They thought if people want to come into labs to meet scientists, why not bring the scientists out to the people? And so Pint of Science was born. In May 2013 they held the first Pint of Science festival in just three cities. It quickly took off around the world and is now in over 150 cities.

https://pintofscience.co.uk/about/

**Orzo does not contain a misprint, it is simply the word orso (bear) written according to Pisa dialect and is also the Italian word for barley, that is one of the cereals used for brewing beer...*

C.Bradaschia

Léa Lhopital

Hi everyone! Nice to meet you! First, I would like to thank you for your welcome here in EGO. My name is Léa Lhopital and I am an intern in the optics group. I am French and I am studying physics (last year of my bachelor's degree) at the university of Franche-Comté (Besançon).
My professional project is to become a researcher in physics (and perhaps a university teacher too) or at least to be an engineer.
That's why I decided to apply here to do my internship, which is from the 2nd May 2017 to the 31st August 2017, and I believe that this experience will help me to clarify my professional project.

In the optics groups I am working on the "Scanning Fabry-Perot Imager".

Unfortunately, I don't speak Italian, but I hope that at the end of August I will be able to. I am a really talkative and inquisitive person so don't hesitate to talk to me.

Raphael Duque

My name is Raphaël and I come from a French engineering school. It is safe to say it is a tremendous opportunity for us interns to make a first step into the world of gravitational waves at an observatory such as Virgo.

My work here will concern the simulation of optical setups, and most particularly of those such as Virgo, which contain complex components and high-precision detectors. Taking inspiration from the past work of the collaboration and the acquaintance of their members with the optics of gravitational waves detection, we are designing a new tool for the gravitational astronomy endeavor and hope that it may contribute helpfully.

I am honored to participate in a world-wide effort for the detection of the cosmic whispers and am eager to find out what the distant and massive objects of our Universe have to teach us.

David Cohen

Ciao! I'm David Cohen and I'm here for an internship so that I can achieve a master's degree in France. It means that you'll see me around until mid-September first and then I will do a PhD for the next three years.

I've been here for almost two weeks and I can already say I feel pretty comfy with the guys to whom I've been introduced so far. I'm looking forward to meeting others! Thank you for the warm welcome!

About my education: In 2014 I passed a French engineering diploma in Physics, electronics and nuclear engineering along with a French MSc in Physics (Nuclei, atoms, collisions). Since last September I have been studying for another MSc (Large-scale research facilities) in order to do a PhD afterwards, which I would also carry out at Virgo. In between, I used to work as a ticket seller in a science museum in Paris (La Cité des Sciences) so I could get closer to the world of scientific mediation and vulgarisation, in which I'm really interested.

For the next four months, I'll be working on control systems, noise hunting and data quality with Nicolas Arnaud in the DetChar group. By the way, he's apparently one of the main guides here, and it would be a pleasure to take part in those kind of projects with him during my PhD.

I'm an easy-going person and I love very much hiking in the mountains so feel free to contact me if you fancy (or just to get together for anything else)!

A presto!

Benjamin Remy

My name is Benjamin, I am a french student and I come from the Paris-South University in Orsay where I did my Bachelor and my first year of a master's degree. I am very glad to do my three month internship with the EGO collaboration, working with Nicolas Arnaud (LAL) from the DetChar group.

This is the first time I have been in Italy and I am really eager to discover its culture and improve my language. I live in Pisa, so I would be happy to follow you, exploring the city if you know it. I also like to walk, so I am willing to hike if you're motivated.

I hope we will meet during these three months and play a ping-pong game!

A presto!
Benjamin

Nathan Flood

Pittsburg State University
Expected Graduation Date: May 2018
*Major1:*Physics(professional sequence)
Major2: Mathematics
Minor: Computing

Nathan is studying math and physics at Pittsburg State University (Pittsburg, KS US). He is working at EGO through an International Research for Undergraduates (IREU) program funded the National Science Foundation (NSF) and hosted by the University of Florida. Nathan is the son of Tim (PhD Mathematics Oklahoma State University) and Chris Flood (M.Ed. English Education Oklahoma State University).
He is a Kansas native, growing up on a small family farm in southeast Kansas. Nathan is in his last year of study at Pittsburg State University, and plans to continue onto graduate school for a PhD focusing in gravitational wave research. At EGO he will be working under Irene Fiori as part of the noise hunting team.

Outreach Prize

At the last March LVC meeting in Pasadena, the winners of the 2017 Education and Outreach award were announced.

The prize is dedicated to the memory of Cristina Torres, an assistant professor at the University of Texas in Brownsville, an extremely passionate teacher who tragically died at only 37.

The award is given annually to one member of each of the Virgo and LIGO collaborations who contributed significantly to the outreach activities of the experiments.

The winners are Andreas Freise, professor at the University of Birmingham and Valerio Boschi, postdoc at the University of Pisa. As stated in the official announcement, Andreas received the prize 'in recognition of his pioneering efforts in creating LIGO-oriented interactive educational applications as well as his outstanding leadership as the founding editor of the LIGO magazine' while Valerio for 'his continuously increasing contribution to the Virgo outreach activities, in particular as a passionate guide of the site tours at Virgo'

As the author of this article, I would like to thank all the people that choose my name. Since I did not even know of the existence of such an award, it was obviously a complete surprise to me to receive it. It was really a nice conclusion of the great week I spent in Pasadena. Thanks again.

V.Boschi

A medal for Frédérique Marion

Our warmest greetings, Frédérique!

We congratulate Frédérique Marion for the medal she was awarded by the CNRS. We reproduce hereafter the motivation that we fully share, after several decades of fruitful and friendly collaboration:

"Frédérique MARION du Laboratoire d'Annecy-le-Vieux de physique des particules (Lapp, CNRS/Université Savoie Mont Blanc) recevra la médaille d'argent. Cette distinction récompense son travail de longue date au sein de la collaboration Virgo, tant sur la mise au point du détecteur que sur l'analyse des données récoltées qui ont mené à la découverte des ondes gravitationnelles."