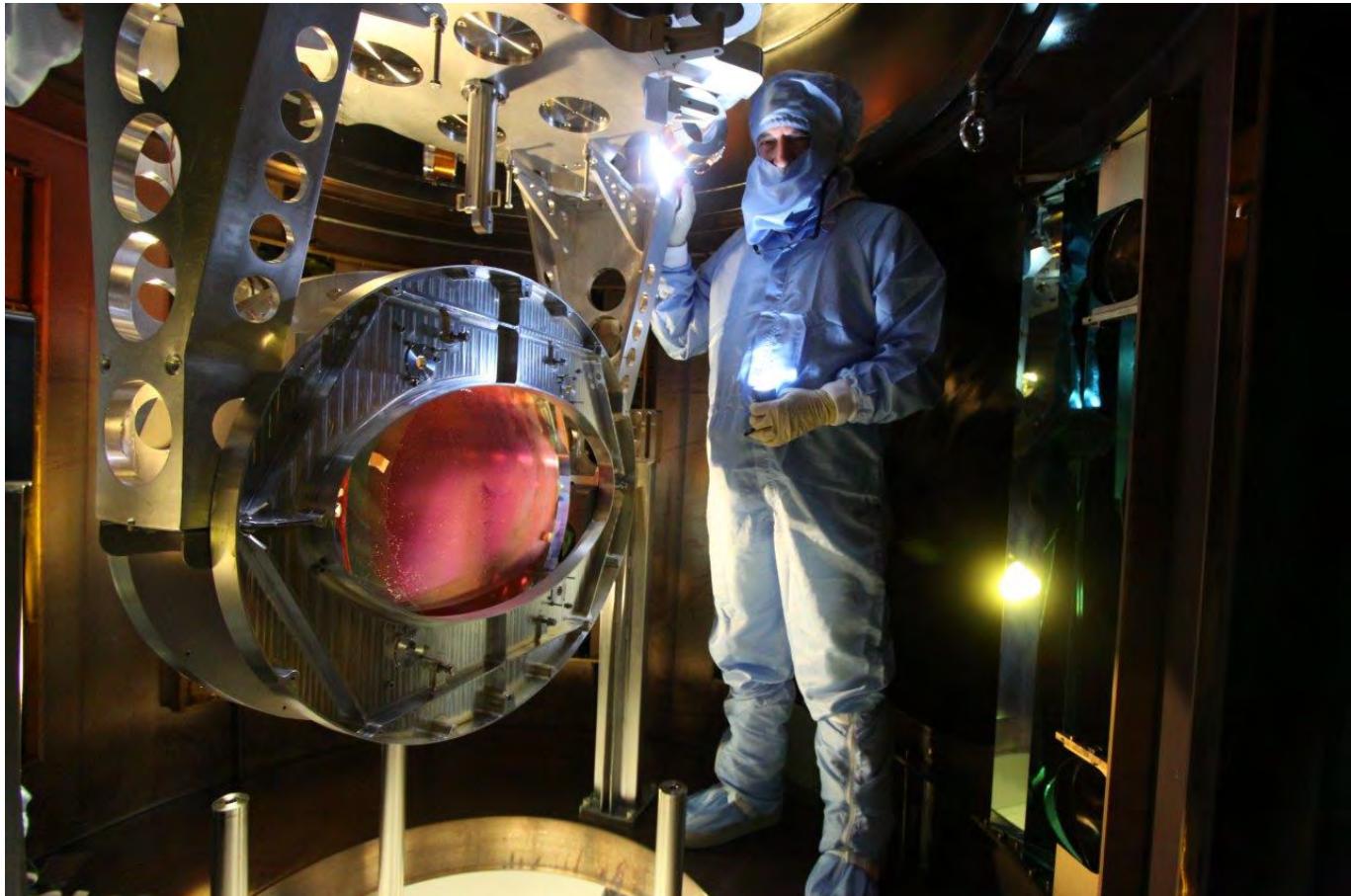


# h

THE GRAVITATIONAL VOICE

number 27  
**DECEMBER 2014**



## LATEST NEWS

A Cold Merry Christmas  
Beam Splitter payload suspended

## NEWS FROM THE COLLABORATION

2013 Thesis Prizes

## NEWS FROM THE SITE

Biathlon 2014  
European Researchers' Night

News from EGO and VIRGO

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"h - The Gravitational Voice" is an internal publication of the European Gravitational Observatory (EGO) and the Virgo Collaboration.

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

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## EDITORIAL (a malicious one)

One day at the beginning of last spring, the Harvard-Smithsonian Center for Astrophysics called an international press conference to announce the discovery, by the BICEP2 South Pole telescope, of gravitational waves generated immediately after the Big Bang, as described by Andrea Vicere' in h26. However, it now looks a bit ridiculous watching the triumphalistic YouTube video (<http://www.youtube.com/watch?v=Iasqtm1prII>). In fact, after the initial enthusiasm, it emerged that the possible contribution to the detected effect by cosmic dust had not been properly taken into account. In particular, it is said that they used a preliminary map of the cosmic dust effect, only informally presented at a meeting by the Planck collaboration.

More recently, the BICEP2 results have been correctly presented, underlining properly possible uncertainties (Lawrence Krauss, Scientific American, October 2014).

The editorial of the October issue of Le Scienze, the Italian version of Scientific American, states that this shows how scientists are able to remain un-dazzled by their results and recognise possible mistakes. My personal opinion is quite different. I think that this story shows how (some) scientists may in fact become dazzled by their results and then only recognise mistakes once forced to by the environment. Or, even worse, they reveal an uncertain, but astonishing, result, just to be able to claim "I was the first" in case of a lucky confirmation.

As a final remark, I would like to underline that the BICEP2 effect (a particular polarisation of the Cosmic Microwave Background) may be due to primordial gravitational waves, but it is not the direct detection of gravitational waves, as performed by interferometers or, in the past, by resonating bars.

And to round off this editorial, Merry Christmas and a Happy New Year to all h readers from the Editorial Team.

*C.Bradaschia  
Chief Editor*

## A Letter For Science

*European scientists warn against science cuts*

Under the title “They have chosen ignorance”, a group of scientists from all over Europe has published an open letter with a signature campaign [1] on the worrisome evolution of research politics in Europe.

They are critical of the fact that, in the name of austerity and for the sake of overcoming the European debt crisis, politicians are trying, in a very short-sighted manner, to save money by cutting investments in countries’ futures.

Similar initiatives are going on in individual countries like Spain [2], Italy [3], and France, where cyclists converging on Paris from all over the country have attracted the public’s attention to the situation of research [4].

Saving money on fundamental research at first sight looks easy, since the effects are visible only in the medium and long term and can at first go unnoticed by the broad public; moreover, science politics in Europe is presently in the process of shifting its focus more and more to applied research, preferably carried out and financed by private companies, in order to reduce public expenses.

The arguments here also seem convincing: research is considered an investment which gives an immediate benefit in terms of new products, increasing the country’s wealth while reducing the taxpayers’ burden if carried out with private money. However, these arguments ignore the fact that applied research is just the application of basic research, and without fundamental research at



*French science supporters converging on Paris to protest about funding cuts [sciencesenmarche.org]*

the base, there can, in the long term, be no applications.

The discovery of X-rays emerged incidentally from research which had not been targeted at medical diagnostics, and the scientists doing research on nuclear magnetic resonance could not have foreseen the applications in medical imaging that became possible decades later with the development of technology, especially computing; with a purely application-oriented political approach, this research might not even have been funded.

Limiting research to applied industrial research does not take into account the way science works; major innovation is rarely possible without prior generation of new knowledge founded on basic research.

Cutting research funding also undermines the basis of a technology-based society, and weakens the educational system, tightly linked to research in universities and research institutes.

The authors of the letter emphasise the risks of this short-sighted political approach, especially for the countries which have suffered most from the Euro debt crisis; by cutting funding for research, they cut the roots of a tree which it has taken generations to grow and whose weakening makes the countries even more vulnerable to crises in the future.

The consequences of these politics can already be seen today: together with the general tendency to decrease the public sector, reduced science budgets reduce the prospects of young researchers in their home countries, causing them to migrate from the South of Europe to the North, where the situation is better, or out of Europe altogether; a brain drain corresponding to an enormous waste of education investment undertaken and a loss of human capital bitterly needed to ensure a modern society remains competitive. This is especially true in Italy, where since 2008 the number of new permanent positions for academics has shrunk by 90%.

A final word on the common argument that scientific research has an excessive cost and therefore is one of the major areas where savings should be made: Let’s take the European Space Agency’s Rosetta mission to explore the comet Churyumov-Gerasimenko as an example.

Even for this enormously complex and expensive research project, the cost is modest compared to some numbers one rarely thinks about: the mission’s cost of 1.4 billion euro, shared by many countries and spread out over 20 years, corresponds to just half a day of world-wide military expenses; it is less than the cost of one single modern nuclear submarine. There is an interesting blog [5] on this and similar subjects.

Cutting our investment in the future would be very short-sighted indeed.

[1] <http://openletter.euroscience.org/open-letter/>

[2] <http://www.nature.com/news/scientists-decry-spanish-cutbacks-1.10242>

[3] <https://www.cun.it/homepage/evidenza/lettera-aperta-del-cun-al-presidente-del-consiglio-dei-ministri/>

[4] <http://sciencesenmarche.org/fr/>

<http://smarcell1961.blogspot.it/2014/05/lhc-sara-pure-interessante-ma-ha-un.html>

[5] <http://smarcell1961.blogspot.it/2014/05/lhc-sara-pure-interessante-ma-ha-un.html>

### A Letter from America

*Coming back one year later:  
impressions*

The fifth international commissioning workshop was held at the Virgo site last October.

Don't worry, I'm not going to bore you to death with a report of the many interesting discussions we had. It will suffice to say that for the first time I saw suspension and seismic isolation people from all collaborations sit together in the same room. I'm sure there will be plenty of reports and useful results.

But for me, this workshop was the occasion to come back, after one year, to a place that I used to almost consider a second home. When Carlo asked me to write an article for h, I didn't know where to start, so here is a collection of sensations, thoughts and impressions, in random order.

People really drive badly here. It feels strange to ring the bell to get in. And at the reception they don't know you anymore...

Not much has changed here.

A lot of things have changed here. Hey, there was much more space here in the main building.

That's the signal recycling tower...

Funny that so many people did not recognise me! Well, I guess it's my fault: short hair and no glasses make quite a difference.

Ah, the canteen. Maybe the only thing I'm missing...

What's that thing falling from the sky? Ah, yes, now I remember. Rain. It's been a long time.

It's good to be back and see some old friends.

It'll be good to go back to California...

This central building looks even smaller, now that I'm used to the LIGO one.

You're really still keeping that picture on the control room wall?

G. Vajente

*Detail of the travelling interferometer.*



### Beyond the Limit

'Oltre il Limite' (Beyond the Limit) is the title of a temporary exposition that has been organised by the INFN at MUSE, the Science Museum of Trento (<http://www.muse.it/it/Esplora-mostre-temporanee/Archivio/Pagine/Oltre-il-limite.aspx>).

As per tradition, a Virgo exhibit must be included in any INFN-organised show. In the picture, you will recognise an artist's view of a detail of our travelling interferometer, borrowed from the entrance of the EGO Main Building.

On this occasion, I take the opportunity to invite our readers to spend a couple of hours visiting MUSE with their children, maybe while en route to or returning from skiing in the Alps.

This is not because of our interferometer, but rather because of the many other 'hands-on' exhibits and, even more, for the natural surroundings and the building, which was designed by Renzo Piano, the world-famous architect, and which takes inspiration from the slopes of the surrounding mountains (<http://www.muse.it/en/il-muse/edificio/Pages/Home.aspx>).

C. Bradaschia



MUSE - The Science Museum of Trento.

## The New Limonaia

As many of our readers may know, Virgo and EGO have long had close relations with “La Limonaia – Scienza Viva”, a scientific cultural association that has been active in Pisa for many years; in particular, they have helped to disseminate information relating to our outreach activities, as well as with site-visit organisation; we have also borrowed a beautiful telescope from La Limonaia for our observational evenings.

At the end of last year La Limonaia folded, following the withdrawal of the majority of the partners (local authorities, foundations and universities). This decision was made on grounds such as: reduction of public budget, the suppression of the Provincia di Pisa and the creation of the Cittadella Galileiana by the Comune and the University of Pisa; all of which are, in my opinion, reasons that are not quite realistic. There has clearly been a reduction in available monies, but this has not really been affected by the modest cost of La Limonaia. On the contrary, nobody knows when the Provincia will be suppressed or when the Cittadella will come into operation, in order to cover the area of activity of La Limonaia.

As such, Pisa will be deprived for several years of a very useful cultural institution.

As a remedy, a few dozen individual supporters and collaborators (I am one of them) of La Limonaia decided to create a new association: “La Nuova Limonaia - for the diffusion of scientific and technologic culture in the different fields of knowledge”.

Of course, with the income of the

association fees it is just possible to maintain a part-time secretary for ordinary management and all of the activity is based on conferences, debates and film projections in schools and other locations that are offered for free. Contemporarily, we are looking for new members (will some of our readers join us?) and for support by public and private entities (will EGO become one of our founders and stakeholders?).

You are invited to visit the site of La Nuova Limonaia to learn more: <http://www.lanuovalimonaia.it/>.

*C. Bradaschia*

## Braccini and GWIC prizes

On Friday the 11th of December, during the plenary session of the last Virgo Week, the 2013 GWIC Thesis Prize was awarded, by Fulvio Ricci, the Virgo Spokesman, to Sheon Chua.

The prize was awarded for Sheon's thesis on “Quantum Enhancement of a 4km Laser Interferometer Gravitational-Wave Detector.” Dr. Chua received his Ph.D. from the Australian National University and was nominated by his adviser, Prof. David McClelland. He was a part of the team that performed a full-scale demonstration of squeezing on the LIGO interferometer at Hanford, and was also responsible for the design and implementation of a low-backscatter optical parametric oscillator (OPO) cavity for squeezing, and for characterizing the noise level due to backscatter. Sheon is now a member of the LKB Virgo group.

The Stefano Braccini Thesis Prize was awarded to Tjonne Li at the August LIGO/Virgo meeting at Stanford.

Tjonne Li's thesis was on “Extracting Physics from Gravitational Waves: Testing the Strong-field Dynamics of General Relativity and Inferring the Large-scale Structure of the Universe.” Dr. Li received his Ph.D. from Vrije University in Amsterdam, and was nominated by his adviser, Prof. Chris van den Broeck. Tjonne's thesis focuses on an innovative Bayesian framework for performing hypothesis tests of modified gravity using ground-based gravitational-wave data. After developing the framework, Tjonne simulates a variety of General Relativity deviations and demonstrates the ability to measure them. He is now an LSC member.

Nominations for the 2014 GWIC Thesis Prize and for the 2014 Stefano Braccini Thesis Prize will soon be open. Both prizes recognise outstanding PhD theses in the area of gravitational waves. There will be a common call for nominations and all theses submitted will be considered for both awards by a joint selection committee. Two winners will be selected, with the GWIC Thesis Prize emphasizing the impact of the research on the field of gravitational wave science, while the Braccini Thesis Prize will be awarded with an emphasis on innovation.

GWIC is also privileged to nominate both thesis prize winners for publication in the Springer Theses book series. Subject to certain qualifications, Springer Theses publishes exceptional Ph.D. theses in the physical sciences in their entirety. If accepted, each winner will receive an additional €500 from Springer upon publication.

The announcement, with instructions detailing how to submit nominations, has been issued at the beginning of December.

*C. Bradaschia*

### Outreach in Autumn 2014

This year, the European Researchers' Night arrived at the end of a very intense week, which was fully dedicated, here in Pisa, to the 100th Congresso della Societa' Italiana di Fisica (SIF).

This eventuality increased our workload, but produced several synergies: conference participants visiting EGO, Virgo components displayed in the conference hall, the dramatic "Io dico l'universo", fragments of Galileo's lecture, at Teatro Verdi in Pisa, the monologue "Madame Curie, una donna" at the Citta' del Teatro in Cascina, and, not to be disregarded, the "aperiscena" in the theatre foyer, offered before the monologue; aperiscena being the junction of the words aperitivo and scena (stage), mimicking the more usual apericena: aperitivo + cena (dinner).

Another 2014 novelty was the celebration of the Night by the University of Pisa in its entirety; this improved public exposure and interest, which also increased participation at EGO.

Together, we set up, as requested by the European Union, a "European Corner" in the very centre of Pisa; this was a gazebo where, all week long, we advised the public on the approximately 100 science-promoting initiatives of the coming Night.

The result, about 650 visitors, was satisfactory. This was also thanks to our classical events: site visits, astronomical observations and "build your own interferometer" workshops.

On September 25, within the framework of the European Researchers' Night, we performed the

official inauguration of the Advanced Virgo Laser Injection System, in the presence of the former Italian Minister for Research and Universities, a delegate of the Regione Toscana and of the Mayors of Cascina and Pisa.

On October 24 we took part in an initiative that I would define as "odd": a conference on astronomy for blind people.

In spite of the contradiction between this activity and the impairment of the audience, participation was numerous and highly interested.



*The European Corner in Borgo Stretto, Pisa*



*Eric Genin switching on the laser injection system for Advanced Virgo*



*Happiness and satisfaction at the appearance of the laser beam.*

The difficult part was that which was related to observational astronomy, but it was well managed by the enthusiastic eloquence of Francesco Palla, former director of the Arcetri Observatory, with the help of many “touch me” mock-ups of the moon surface, of the Saturn rings and of the solar system, supplied by the Associazione Cascinese Astrofili.

The easy part was mine, thanks to the frequency of detectable gravitational waves, which is exactly coincident with the audible spectrum. Listening to Virgo simulated signals successfully concluded the afternoon.

On October 29th, in the framework of the Genova Festival della Scienza, we organized a four-voice conference/discussion “L’eco del Big Bang: cosa sappiamo e come la cerchiamo”. France being the 2014 guest country, the speakers were: Matteo Barsuglia, Eric Chassande-Mottin, Eugenio Coccia and Stavros Katsanevas. The result was great: people sitting on the floor, as if at a rock concert!

### Plans for the future

With the boost provided by the EGO Director, the Virgo Spokesman and the VSC we are starting a new era in EGO/Virgo outreach activity, requiring the coordinated participation of all of the Virgo countries. This is an effort that is strongly recommended by the European Union, as well as by our national authorities.

The EGO/Virgo Outreach Team is being assembled with at least one member per country, while regular meetings are being planned. The aim is to develop the outreach activities that are well coordinated among the different Virgo countries, in order to be ready for the first detections era. In addition to the traditional activities, a new outreach web page and new brochures and leaflets at various levels and in all Virgo languages will be prepared.

Next year we plan to be official Partners of the International Year of Light (IYL2015). In this framework the Open Doors Day will take place in the period of the 9-25 May, with the name "IYL-GOLD" (Global Open Lab Day - <http://www.light2015.org/Home/Event-Programme/2015/Other/-GOLD-Global-Open-Lab-Days.html>).

Finally, on the occasion of the 2015 European Researchers' Night, we plan (and hope) to inaugurate the operation of the full Advanced Virgo interferometer

C. Bradaschia

### Biathlon 2014

Tuesday the 16th of September, Federico Ferrini once again signalled the start of the race, getting the 2014 edition of the Virgo biathlon underway!

This year, 5 teams fought for the title: Ele-Lab (which stands for Elettronici-Labronici, which means the Livornese Electricians), the Expats (EGO members), the French Connection (LAPP-LMA members), Naples and the Pulsar Team (Rome1 members).

The teams were made of more or less experienced runners and bikers and for the very first time in the history of the biathlon, all teams registered had a female member/component. That is until the Naples team, understanding that the competition might be tougher than expected, decided to fine-tune its strategy and made a last-minute change to their team composition!

For a handful of reasons, the organizers decided not to change the typical path of the biathlon, which foresees 3 runs of 1, 2 and 3 km respectively, and one 6-km bike ride.

While the 2- and 3-km runners, as well as the bikers, went to their positions, the 1-km runners were called to the starting line. At 6:29 pm they were perfectly aligned. At 6:30 pm, the race started and the energy was unlocked!

Being a 3-km runner this year, I could not follow the progression of the athletes and the evolution of the team ranking. However, Federico Paoletti stoically and fairly (despite a natural inclination for Ele-Lab) took the mid-path time of each team, when the bikers finished the first 3 kilometres of their ride.

Meanwhile, pressure pushed the 3-km runners and eventual finishers of the race to warm-up while waiting for the baton hand-off, a delicate moment, which, if unsuccessfully managed, can lead to the loss of precious seconds.

Staring at the horizon along the west arm, we finally noticed a point moving in our direction. When it was close enough to be identified, the Ele-Lab 3 km runner exulted: Roberto Cavalieri was coming first! And by that time, we could not distinguish any further moving point behind him.

The first baton hand-off went well for the Ele-Lab team and, when Eric from the Expats was then recognized, it made me glad to see our team was well ranked!

Eric finally arrived and I started running, focusing on the figure ahead of me, which Loic did too when he started running.

It was tough to keep a fast pace, but I did it and was able to overtake the leader for the last 500 metres, until Loic, in a final, strong effort, passed the finish line just a few metres ahead of me, to the joy of the supporters who attended a nice finish!

So the final ranking for the 2014 edition was:

1. the French Connection
2. the Expats
3. the Ele-lab
4. Naples
5. The Pulsar team

Many thanks to the athletes who competed once again and to the colleagues and their relatives who attended!

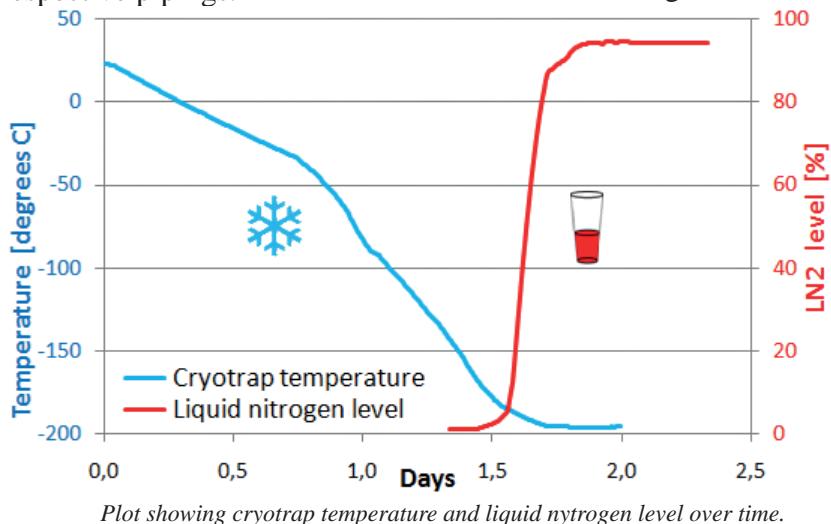
*S. Perus*



### Latest News

In conclusion to the story begun in h23 - March 2013 - with an article on the need for large cryotrapes at both ends of the 3-km vacuum pipes, and subsequent to h25 - March 2014 – in which we published pictures of the almost-finished cryotrapes in the factory, today we report the conclusion of the story: after several months of thorough tests at Nikhef, the first two cryotrapes have been installed at the North and West Ends, while the other two are on site, ready to be installed.

The terminal liquid nitrogen 10 m<sup>3</sup> reservoirs have been recently installed, together with the respective pipings.



*The crowds enjoyed the biathlon once again .*

Finally, the WE cryotrap has been filled with liquid nitrogen and its correct performance has been tested for more than one week.

During the Christmas holidays, the residual liquid nitrogen will evaporate and the trap will return to room temperature, thus awaiting the start of continuous operation, around mid-2015.

This “Cold Merry Christmas” is the result of a Collaboration-wide effort, involving: Nikhef, EGO Vacuum, Electronics and Computing and Genova. Last, but not least, the EGO safety service took care of a control and alarm system covering lack of oxygen in case of nitrogen leaks.

## ...Very Latest News

The new Beam Splitter payload has been suspended! See the following amazing photos provided by Maurizio Perciballi.

C. Bradaschia

### Laurea cum laude

We are very happy to congratulate Jinglei Zhang on achieving a Master's degree in Physics, obtained "cum laude" on October 22nd, discussing a thesis on squeezed-state applications for quantum computing, the worldwide frontier of computer science.

She reached this prestigious goal as a student of the Scuola Normale, the top university college in Italy. The reason for our congratulations is two-fold.

Firstly, Jinglei is the daughter of our old friend and collaborator Zhang Zhou. Working with us since the construction of the first full size vacuum pipe prototype, his contribution was irreplaceable for the realisation of the Virgo vacuum system.

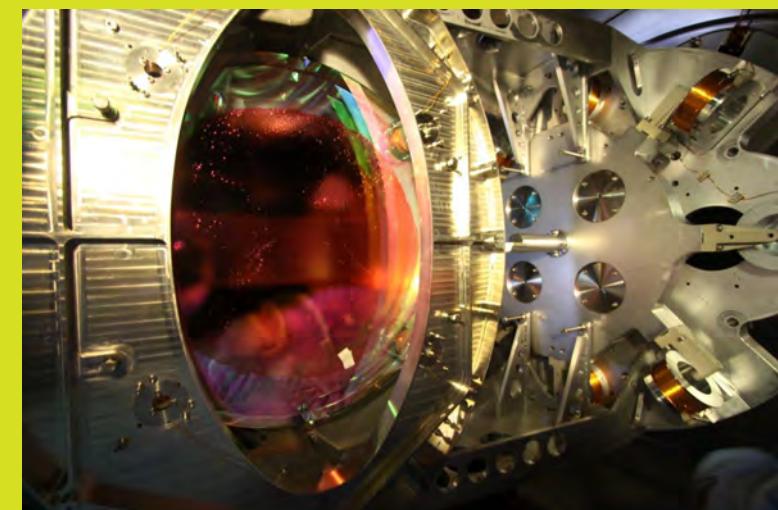
Secondly (as I discovered at the thesis presentation) the subject was quantum squeezed states, a fundamental physics feature, which is also being studied so as to be applied in Advanced Virgo.

C. Bradaschia

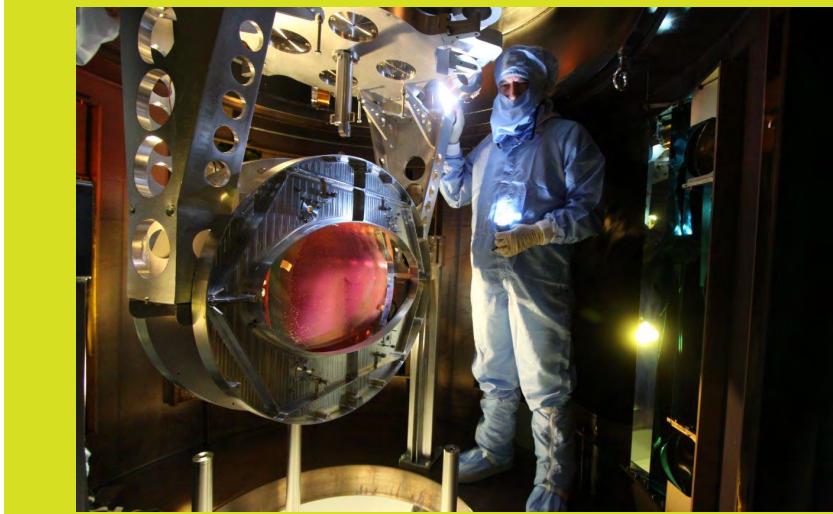
### The Indian Wedding of Viswanath Bavigadda

**SP: Hi Vis! The h editorial team recently heard some rumours about you, saying that you were engaged and would get married soon. Is it true?**

**VB:** (Laughs) Yes! I will marry around the end of December. The day is fixed, but there might be some adjustment since, in our traditions, we look at the astrolo-



*Splendid photos of the suspended beam splitter payload.*



gical aspects and at the positions of the planets.

**SP: India and Italy, and more generally Europe, have very different traditions/habits regarding marriage. I am thinking in particular of the way to choose the spouse. Can you tell us how it happens in your country and in particular, for you?**

**VB:** Sure! Weddings are somehow arranged in our country between the respective families of the couple who will marry. But this does not mean that the couple is kept out of the "arrangement process". Indeed families think about possible wife/husband and if they know her/him, the closest friends participate in the final

"selection process" by providing information on the person considered. In my case, my brother's wife knew closely the girl I am going to marry; therefore through my sister-in-law, my family started enquiring about that girl and her family. Also, close friends of mine who know her took part in the enquiry by giving their impressions about that person to my family.

You see, when we make "enquiries" about the other person, it's not like contacting a private investigator and make him spy on the person's life.

It is more subtle and consists in getting a picture of the person on aspects we consider as important.

For instance, the level of education.

One more thing: the wedding is arranged in the sense that yes, families look for someone who might correspond to their son or daughter. But it is possible to meet several persons before choosing someone.

Eventually I have the final word and may refuse to marry someone if there is no affinity with her. Indeed the choice is made on the basis of a good balance between my family and myself.

**SP: I see. That's very interesting! And what are the most important requirements to which the other person should match?**

VB: As previously said, education matters a lot. We try to choose someone with the same level. Then since there are in India different religions practiced (Hinduism, Buddhism, .. but also Christian and even Jewish religions are represented), belonging to the same religion is preferred. And having common friends is appreciated as well.

**SP: Tell me, how a typical wedding takes place in India?**

VB: Well, I am Hindu and marriage is one of the most important ceremonies in the Hindu religion. It's not only establishing the bond between two people, but also the bond between two families.

Typically, the wedding lasts three days.

The first day will be a kind of pre-marital ceremony, the preparatory day for the bride and the groom simultaneously with their respective families and closest relatives.

The bride will be wearing the typical yellow (or sometimes white) silk saree on the day of the wedding; the groom will be wearing white clothes.

The second day is the day of the ceremony and it occurs around the "homan". It is a Sanskrit word that refers to a ritual with a sacred fire as the central element. Bride and groom sit opposite and a priest accomplishes the ritual linked to the marriage.

I will tie a knot three times in a shawl at the neck of my betrothed and then we, as a couple, will walk around the fire for up to seven times, as a kind of purification with respect to the elements of the Universe.

This walking around also symbolises the fact to become responsible for showing to the bride better sides of life such as love and affection.

At this stage, we are now a couple and families, relatives, friends start presenting themselves to us one by one, blessing our union, offering us gifts. This is followed by a traditional lunch all together!

The ceremony usually takes place at the bride's hometown, upon the families' agreement.

On the third and last day, we call a reception with a lunch at the groom's hometown to announce the marriage to the people who could not come the day before.

**SP: I guess there will be many people.**

VB: Yes, from the side of my fiancée, there should be about 300 people and from my side, I am expecting as many people. This makes at least 600 people! Some people say I'm going to have more guests at my wedding than George Clooney had at his! Laughs....

**SP: What kind of gifts do people usually receive at their wedding?**

VB: Typical gift is gold jewels. Earrings, rings, nose rings are offered to the woman whereas the man may receive bracelets, necklaces.

But it is not compulsory to bring a gift. It depends on how close you are to the married couple. Ah! I did not mention before that meat and alcohol are not accepted during the wedding lunch.

**SP: What's the name of your fiancée?**

VB: Her name is Susmitha. It means "good smile".

**SP: That augurs well! Thank you Vis for telling me all these things! We hope to see a picture of your wedding in our next issue!**

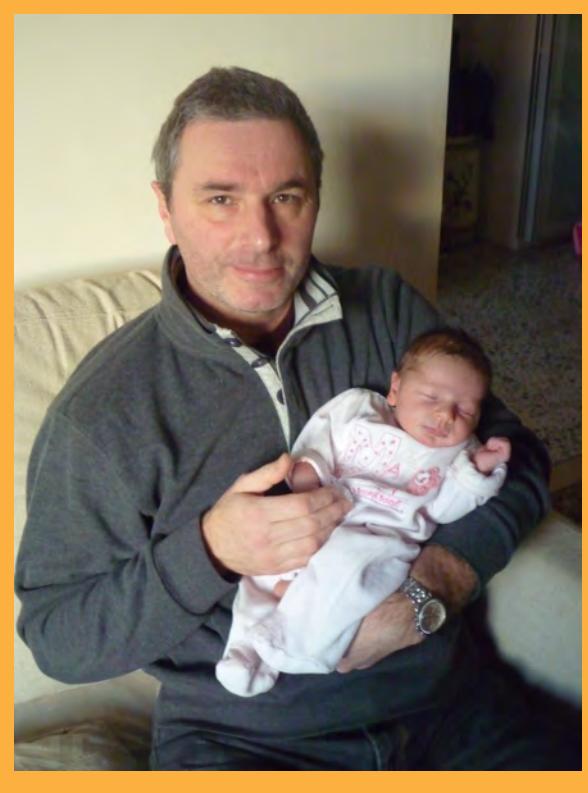
S. Perus



Vis. enjoying his last days of liberty.



*Zoe, a very nice name for a baby-girl, born on 4 September who brings a great joy in the Mantovani family!  
Congratulations to Maddalena and Monica!*



*A warm welcome to the new baby, Carolina, who has recently arrived in Roberto Cavalieri's family!  
Best wishes to Roberto, his wife and the three daughters !*