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THE GRAVITATIONAL VOICE

number 1
JULY 2006

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EDITORIAL

Dear readers,

On behalf of the editorial staff, I have the pleasure to welcome you to the first issue of this new review. **h** would like to enhance among its readers the feeling of belonging to a team of people working towards a common aim; but also of belonging to a community of friends.

We would like also to diffuse as much as possible knowledge about our activity and our progress. Our target readers are not only scientists, but the whole EGO staff and Virgo collaboration. A natural extension is the VESF (Virgo EGO Scientific Forum). In the future we may aspire to reach a larger community and involve other gravitational wave projects; but, for a smooth start, we prefer to begin with a limited purpose.

Our goal is to inform, amuse, and maybe teach, sometimes. Trying to be true journalists we will undertake interviews and make enquiries on hot topics. Reader suggestions will be important to this aim. **h** may be a forum to debate subjects and problems relevant to us, but not appropriate to be discussed in institutional meetings.

h will be published quarterly on the EGO web site. While publishing on the web we do not intend to produce a web page with news and information, doubling the EGO/Virgo web sites. Therefore what we shall write will be hopefully interesting and amusing, but not necessarily complete, systematic (...and boring).

The typical **h** issue will contain: news from the worldwide gravitational wave community, including information about status, performances, runs of the various detectors; news from the site and from the labs, latest advancements of Virgo; status and evolution of the infrastructure; an article dealing with a science or technology subject developed in a popular way - it is natural to begin describing the laser in this first issue; social news, including newly arriving/leaving colleagues, births and weddings; a column reviewing and suggesting books, articles, conferences; a section for advertisements (buy/sell/rent, jobs) to help colleagues in everyday life.

Of course we would like to establish a fine relationship with our readers, so please write to pose questions, to make suggestions, to criticize, to ask for information. Selected questions will be published and answered in the column “Reader Letters”.

As editorial staff we have editors from EGO and from Italian labs, but we completely miss help from the French side; please volunteer to join us. We are also looking for correspondents from all the Virgo and VESF labs. We heartily hope you will enjoy reading **h**.

Carlo Bradaschia

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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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Preparing for the Future

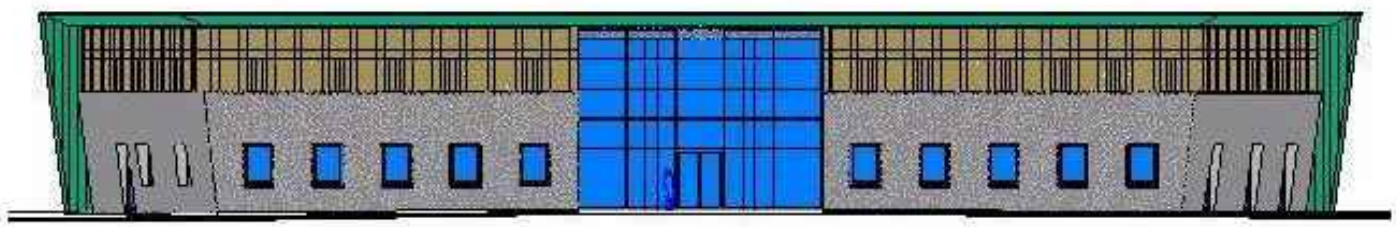
The site is improving its facilities all the time. Most notable for their visual impact are the construction works that are going on at the moment.

At the time of writing the new main building is growing up: the top ceiling concrete has in fact been laid down. This building has been constructed for the following main purposes:

The civil works are expected to be completed by summer 2007 and the outfitting by the end of 2007. Progress can be seen in the photo as compared to the project.

New laboratory spaces have been created there and are now operative:

A large pit with an enclosure to hold the cryostat realized within the EGO supported R&D program for



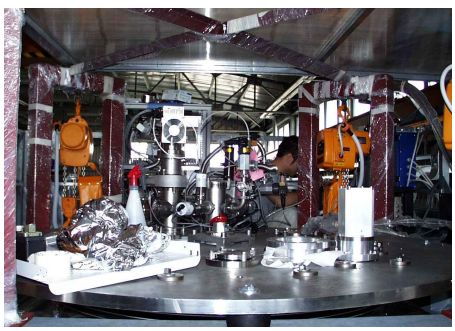
- to reduce office overcrowding and to have more office space for newcomers
- to move personnel out of the offices created in the present temporary barracks
- to have a large auditorium capable of holding one-hundred people
- to have medium-size laboratory spaces
- to have a cafeteria

EGO is also busy in preparing for the future activities of Virgo and beyond.

The construction of the new computing room in the top floor of the control building is now almost complete and ready to host the EGO 300 Gflops computing farm for on-time data analysis for Virgo. It has been designed to accept the high heat flow produced by modern computing items in densely packed racks. This requirement forced us to modify the roof of the building to accommodate high power heat exchangers that run without water to avoid accidental flooding of the computing equipment.

EGO is also preparing for the upgrades of Virgo, equipping the intermediate building at 1500 m of the West arm of the interferometer tunnel. The left picture shows the laboratory and office space.

the next generation of interferometers for research studies on reducing thermal noise by lowering the temperature of



payloads to liquid-Helium-temperatures. This R&D program had been proposed by a coalition of several Virgo groups plus some external groups.

A laboratory for preparing silica fibres to be used for realizing "monolithic suspensions" for Virgo+ by a technique that uses an O-H flame, developed by the Perugia-Virgo group within an EGO-funded R&D program:

A second laboratory for preparing silica fibres to be used in the creation of "monolithic suspensions" for Virgo+ by a technique that uses a laser developed by the Glasgow-GEO group within an EGO-funded R&D program:

A laboratory to mount the test payload for Virgo+:

F. MENZINGER

Latest Virgo Advancements

Virgo is still recovering from the long shut-down started on September 19th 2005. On that date the interferometer was stopped in order to replace the previous Injection Bench (IB) with a new one, which would allow to operate the machine at full laser power, i.e. with about 10 W of laser power entering into the interferometer. The installation activity on the new IB covered the last part of 2005, a laser beam being again available inside the interferometer at the beginning of the new year. Since then the activity has been dedicated to the restart of the optical control of the interferometer, and to the solution of old and, mainly, newly-discovered problems.

Once the laser beam was aligned again with respect to the suspended masses, it became immediately apparent that thermal effects were occurring, i.e. heating of some suspended component, inducing misalignments of the interferometer, thus preventing its locking. Investigations showed that the effect was due to a poor centering of the beam with respect to the beam splitter, and, consequently, it became clear that other components were miscentered in the vertical direction, in particular the optics of the detection system. The heated elements turned out to be the suspension wires. These conditions were presumably already there before the shut down of September 2005, but, owing to the lower power that the interferometer was operating with, the effect had been unnoticed. It became evident only when the stored power was increased by more than a factor of 10. Consequently, a long action devoted to translating the incident beam, steering the laser beam and the IB at the same time, was performed. This operation also aimed to improve the beam quality, namely its astigmatism, which was resulting from a not perfect centering of the off-axis parabolic telescope that collimates the beam into the interferometer long cavities. Thanks to the fact that the new Power Recycling mirror is plane, these operations are now easier than before the shut-down, when that mirror was a lens. At the beginning of May the centering of the suspended optics and the beam astigmatism issues were essentially overcome, and locking activity could start again, together with the automatic alignment procedure. The goal was to achieve a full stable locking as soon as possible, in order to be able to provide a new sensitivity curve for Virgo, the last sensitivity curve dating back to September 2005.

Unfortunately, thermal effects are still present, this time not being related to suspension wires heating. It rather seems that the input mirrors are being heated, inducing a thermal lens effect and consequently a defocusing of the sidebands inside the recycling cavity. This probably leads to sidebands power losses, and locking loop instability. The explanation of the heating effect is being investigated: nominally, the measured losses of the input mirrors shouldn't produce the observed thermal lensing effect. Thus, a worse level of losses, either in the substrate or in the coating, is suspected.

However, the instability quite quickly drives the interferometer to longitudinal unlock, average locking stretches on the dark fringe lasting a maximum of tens of minutes, and consequently it is difficult, if not impossible, to tune the automatic alignment control. The interferometer, with a fluctuating locking control, and in the impossibility to close the automatic alignment system,

cannot be locked steadily. In the figure (courtesy of G. Hemming), the maximum duration per day of the locking stretches in the last months are reported (the different colors represent the locking steps, step 11 is the closest to the dark fringe science mode configuration). As can be seen, progress has been made in approaching the dark fringe and in the locking duration, the longest stretch now reaching 600 minutes. The commissioning people have worked hard to try to overcome the problems, by improving the longitudinal control loops and also creating the conditions necessary to switch on the main angular controls, which should make available longer locking stretches and control optimization. Things (and comprehension) are evolving rapidly, and now, even though still in the presence of thermal effects, a more stable locking can be achieved. However, in the case that the stability were not satisfactory, an option could be to decrease the input laser power, in view of reducing the stored power and consequent thermal effects. This could help to understand if the thermal effects are really dominant in preventing stable locking, or if other, not yet understood, problems are playing a role.

P. LA PENNA

Silica Fibres for Virgo Suspensions

Amorphous silica has been demonstrated to be a promising material for the last stage suspension in interferometric gravitational wave detectors. Silica fibres may be used to replace steel wires to support mirrors from the upper mass of the pendulum chain (the famous "marionetta", in Virgo). Its low internal mechanical dissipation and thermal expansion make silica a unique material for allowing low thermal noise in suspensions at room temperature. Thus, in the frequency range of interest, it seems possible to reduce the current suspension thermal noise by about one order of magnitude with the adoption of fibres of "fused silica"(this denomination is used by the gravitational wave community to indicate amorphous silica).

Beside this, silica has two more excellent characteristics:

(a) if properly treated, it shows a strength twice that of steel;

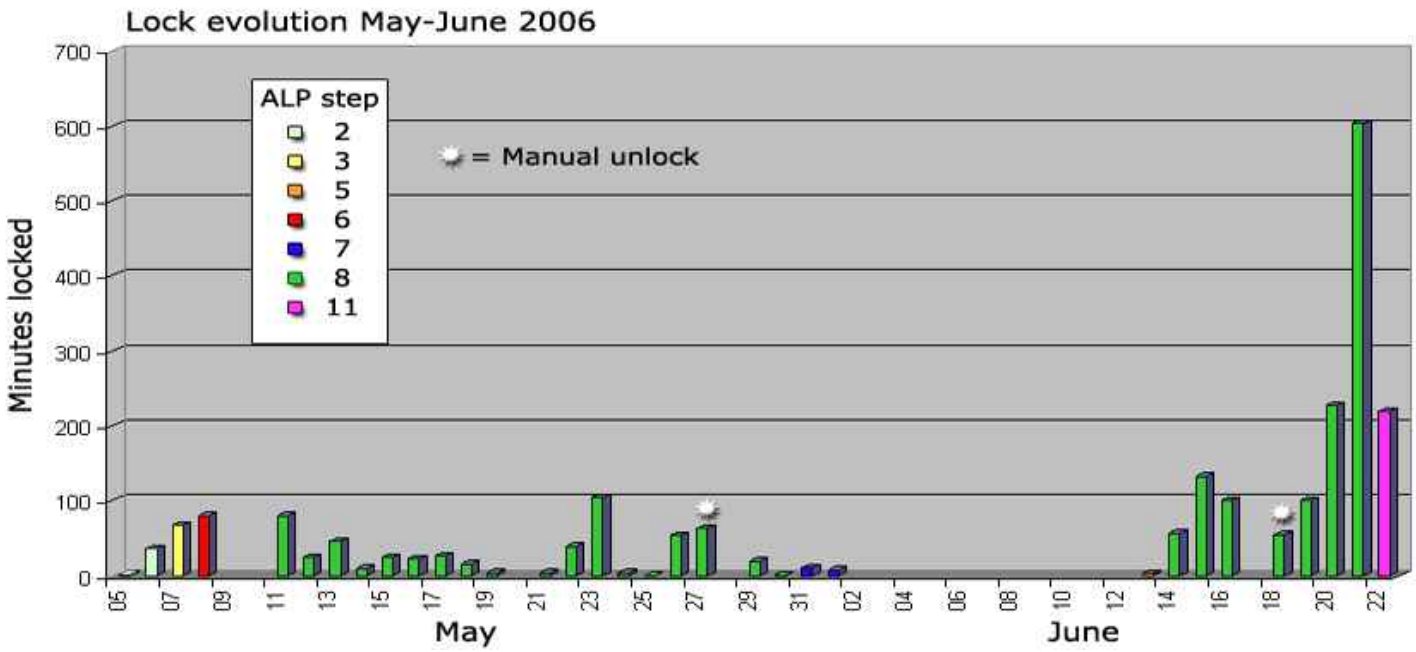
(b) since it is amorphous, the process of welding does not alter its mechanical and thermal properties.

Hence silica fibres can be welded to small silica blocks, called "ears", attached by "silicate bonding" to the lateral surface of the mirror. In this way, mirror, ears and supporting wires constitute a monolithic unit, removing also friction and thermal noise produced at the wire/mirror contact.

In this perspective EGO has promoted a vast R&D effort for the production of reliable suspension silica fibres. Two main solutions have been studied: The H_2-O_2 flame pulling machine and the CO_2 laser pulling machine.

The H_2-O_2 flame pulling machine

Based on a long standing experience in fused silica fibres at the Virgo-Perugia laboratory (H. V., Francesco Cottone, Antonfranco Piluso, Lucio Farnesini, Simone Aisa), a new fully automated facility has been designed, realized and installed at EGO. The principle of functioning of this facility is quite easy to grasp: a short, thick rod of fused



silica is heated by exposure to a H_2-O_2 flame. The two ends of the rod are then pulled at a given speed and a fused silica fibre is thus produced.

The fibre-pulling process is completely controlled by a computer that is part of the facility. The computer controls both the motion of the ends of the rod, through an electrical engine and the H_2-O_2 flux, through an electro-valve that drives a pneumatic-valve.

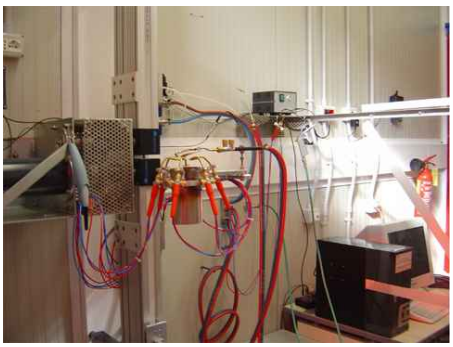


Fig. 1 - View of the central part of the new automated pulling machine installed in Cascina at the west middle-arm building

By using a specifically designed software interface it is possible to set the desired diameter on the computer that automatically selects the pulling speed.

With this kind of facility it is now possible to produce fibres with a diameter varying from a few tens of to 400 microns.

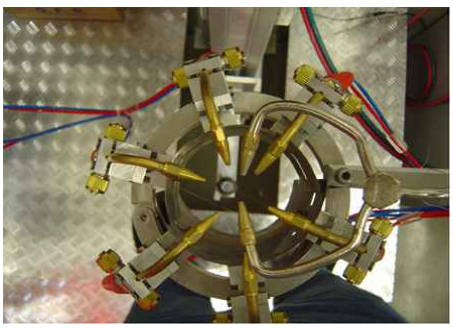


Fig. 2 - Detailed view of the "flame stove" with the two upper cool-air tubes to limit the melting region on the fused silica rod

A 3D Laser Caliper is used to measure the diameter and shape of the produced fibre. It is possible to verify the circularity of the fibre section and to measure the diameter with a precision of up to 0.1 microns.

Fig. 3 - View of the facility with the 3D Laser Caliper in the measuring position

During the tests undertaken in Cascina since last March a number of prototype suspension wires of different diameter and length have been produced. The strength and regularity tests performed with the help of EGO technicians have shown very promising results.

The CO_2 laser pulling machine

The laser machine that has been developed is an evolution of the previous flame heating machines developed by the GEO Glasgow group and yet it represents a break through in this specific technological field. The experience gained in the production and installation of monolithic silica suspensions in GEO 600 led us to the understanding that in the traditional pulling method, where the pulling time has to be shorter than the cooling time of the melted silica (less than 1s), there is not enough control on the shape and length of the fibres. The much slower technique of feed and pull, where new material is continuously melted while the fibre is pulled, gives more flexibility and control, considering the tight geometrical tolerances and variable cross section fibres required in the advanced detectors.

The CO_2 laser as the heating element instead of flames combines the fundamental features of full control of heating and cleanness. The CO_2 laser offers other advantages during welding: precise localization of heating; control on the production of silica plumes; and no blowing of fibres.

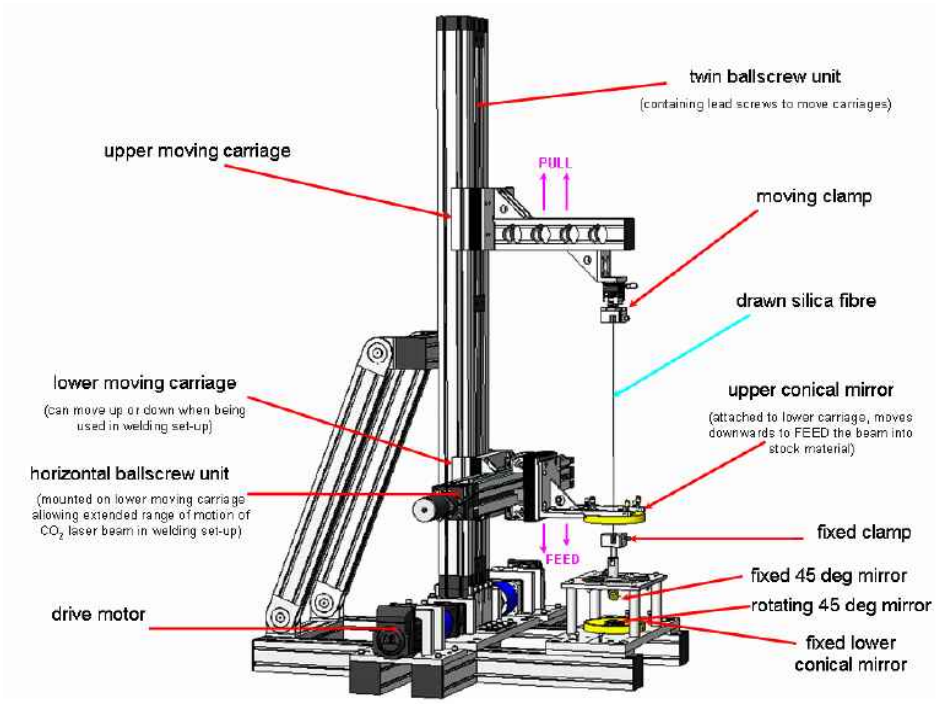


Fig. 4 - Rendering of prototype machine in its fibre pulling configuration

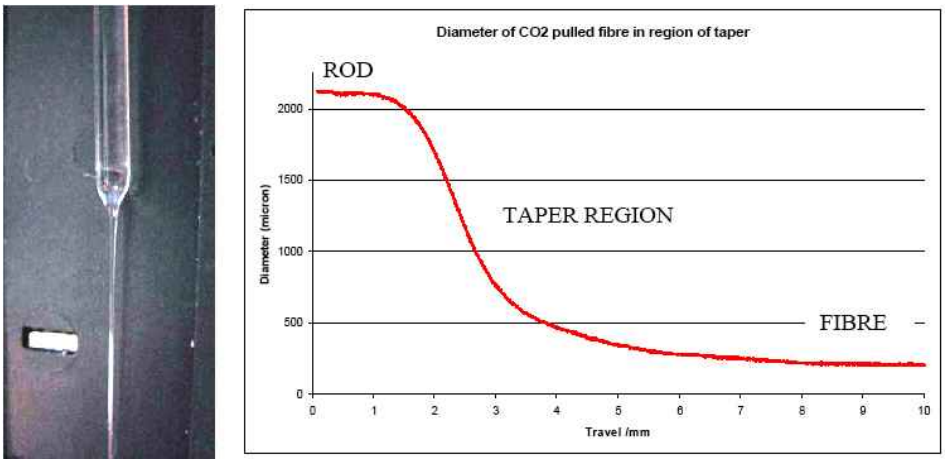


Fig. 5 - Profile of a circular fibre pulled with the CO2 laser machine, the neck can be shaped in a reproducible way

The three axes computer controlled machine that has been developed is able to produce fibres with circular and rectangular cross sections (ribbons) and to weld them on to silica ears. With the changing of functional blocks fully developed, it is possible to switch between the different configurations of the machine, improving in this way the flexibility and the use of the machine as a suspension development facility for advanced detectors.

Two conical mirrors are used to produce circular fibres. The diameter is strictly related to the ratio of feed to pull speed and a typical standard deviation of 5um in diameter has been achieved. The operator can change the speed of the two vertical carriages at each step of the magnetic linear encoder, fixed at the pulling carriage. In this way it is possible to shape the neck with a high degree of flexibility.

Once the upper conical mirror is replaced by the XY mirror galvanometer block, as shown in Fig.6, the machine is ready to deliver the beam on a surface of 93 cm vertical, 47 cm horizontal, with an angular range of 120° horizontal, 50° vertical. The machine is operated through a couple of joysticks.

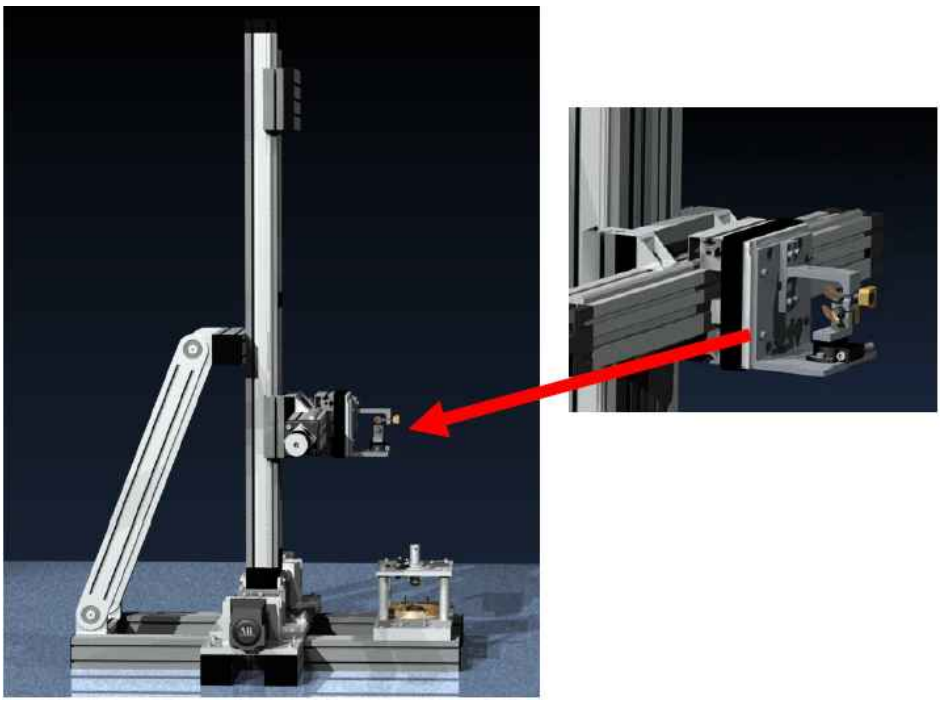


Fig. 6 - The machine in the welding and ribbon pulling configuration

On June 2006 the machine designed, developed and produced in Glasgow, under the responsibility of Caroline Cantley, has been successfully installed at EGO by Alastair Heptonstall and Colin Craig.

H. VOCCA, INFN PERUGIA

C. CAGNOLI, UNIVERSITY OF GLASGOW AND INFN FIRENZE

New Cryogenic Facility

The new EGO cryogenic facility is being put into operation at the 1.5km West arm building, in the context of the EGO funded R&D program. In December 2005 the large facility cryostat was

delivered and the works for its installation began immediately after. A great deal of work has been done in characterizing the cryostat and its pulse tubes cryo-refrigerators. The cryostat will be able to contain a new concept test payload (mirror and marionette) that will operate at cryogenic temperatures down to 5K. Very likely the mirror substrate, and its suspension to the marionette, will be made of cryogenic high thermal conductive mono-crystalline silicon. Mirror modes will be measured in the attempt to verify the thermo-mechanical performances of this new test payload and to measure its thermal noise behavior at low temperature.

R. PASSAQUIETI, UNIVERSITA DEGLI STUDI DI PISA

GWADW 2006

The Gravitational Wave Advanced Detector Workshop (GWADW 2006) has been recently held (27 of May to 2 of June) at the Hotel Hermitage, La Biodola, Elba Island, Italy. The event, organized together with VESF, was attended by more than 100 physicists, both theorists and experimentalists, coming from more than 12 different countries. More than 30 VESF laboratories were represented.

The meeting focused on our research field, spanning from theory and data analysis, to present and future detectors development. Several interesting and very high level talks were presented on: reviews of General Relativity and gravitational waves, astrophysical observations (Earth and Space), status of interferometers and waveforms, gamma ray bursts, rates for bursts and inspirals, status of bars and space antennae (DECIGO, LISA), population synthesis and periodic sources, plan for running and commissioning of the interferometers, future detectors and techniques, data analysis and noise hunting, R&D and R&D for future detectors.

A discussion session on perspectives and summary ended the workshop on Thursday. As usual, the talks will be available on the web soon. The next workshop in this series will take place at Aspen (Colorado), in February 2008, following the nice tradition to alternate between Aspen and La Biodola.

The perfect organization, insured by Lucia Lilli, Francesco Fidecaro and Sydney Meshkov, the beautiful place, the good food and the high level of the talks have made this event unforgettable.

A. DI VIRGILIO

Towards a World Network

Virgo and LIGO are making progress towards a memorandum of understanding (MoU) that, hopefully, will establish and rule a stronger collaboration between the two projects. Virgo and LIGO (and GEO600 as part of the LSC) will exchange their data, perform a joint analysis, plan together the shutdown of the various detectors and publish together the scientific results. The scientific value of the forthcoming agreement could be enormous.

G. LOSURDO

1st VESF School on Gravitational Waves

After four years the former Virgo-EGO-SIGRAV School becomes something new. It is not only a change of name. VESF has taken over the organization, allowing the involvement of people with a wider spectrum of interests. 38 students attended the school. The number of countries represented is high: USA, Brazil, Spain, UK, Germany, Italy, Hungary, Switzerland, France.

As usual, the lecture program was intense and, as usual, students looked a bit tired on Thursday, the day after the social dinner. But, ultimately, they were happy. Everybody can download the slides of the lectures (and some photos shot by the students) from the school web page: www.ego-gw.it/school .

G. LOSURDO
PHOTO: I. GHOLAMI

The Virgo Collaboration is Growing

As the detector gets closer to the design sensitivity the Virgo Collaboration starts growing. NIKHEF, an important Dutch laboratory located in Amsterdam, so far involved in high energy physics experiments, is joining the team according to an initial agreement, enlarging the European scale of Virgo. We will have the chance to visit the NIKHEF labs and facilities soon, since they will host the Virgo Collaboration meeting on July 3-5.

Moreover, new people are joining in Italy, taking over from the former Frascati group: INFN Rome 2 has started the procedure to join the collaboration. They bring precious experience acquired in many years spent on the resonant detectors Explorer and Nautilus.

G. LOSURDO

The LASER

A brief and hopefully intuitive introduction to what a laser is and why we use it in Virgo

I should probably state from the beginning that the aim of this column is simply to offer a minor, pleasurable diversion and it does not have the ambition of being exhaustive let alone rigorous. The reader(s?) is invited to use it like a lighthearted distraction from, paraphrasing N. Armstrong (The Moon, 02:56 UTC July 21st, 1969), the valuable daily activities (small steps) he or she is carrying out to allow Science to advance further on the long path that leads to human knowledge (giant leap).

Virgo is made of many different "pieces" carefully designed and put together with the goal of building a Gravitational-Wave detection device, i.e. an antenna for a very peculiar kind of signal.

These pieces can be thought of as "belonging" to specific branches of science: Mechanics (our beloved Superattenuator, for example), Vacuum (the Tubes, and what is *not* inside them), Electronics (computers and much, much more), Optics. Thinking Optics, among the various elements that come to mind there are our special Mirrors, lots of smaller components like lenses, polarizers etc. and, of course, the Virgo Laser without which all this won't do much good.

I would like to take you along in a ride among the main components of this 80-million-Euro toy we built, hoping to satisfy some possibly minor curiosities you might have about the way they work, curiosities I had myself when I fist started orbiting around the Gravitational-Wave universe.

I thought of starting with the LASER.

Although it is fairly commonplace nowadays, as many other prodigies of technology are —at least in their basic forms—, and we can find it in many gadgets we use daily (CD players, pointers used in meetings, price readers in supermarkets etc.), it is not common knowledge what makes it so special and in which way it is actually different from other light sources we are surrounded by (light bulbs, candles burning etc.).

That is why I would like to draw your attention towards the way I wrote the word in question last time, using all capital letters. As a matter of fact the word laser (coined by G Gould, Columbia University,-NY-, 1957), is actually an acronym that stands for "Light Amplification by Stimulated Emission of Radiation". The name contains therefore more information than you probably care

for, but it gives some hints about its peculiar nature. Incidentally, it is thought by some to be a misnomer, the correct one being LOSER, but more on this point will be given if it arouses any curiosity[1].

Let's start from there and see how it can help us understanding things a little better.

Well, its being Light should not be an earthshaking surprise. So far, so good. Lets tackle now the Radiation aspect. Here too it is likely that most of us can follow along; we associate the concept of radiation to the one of waves travelling in a given direction and this is (partially, as it turns out) true. This is not different though from any other light source we can think of, so where does the difference lay? The key here is the Stimulated Emission part (forget about the Amplification one, both for simplicity and because of the fleeting reference made regarding the correctness of the acronym chosen).

The light emitted by an ordinary source consists of independently generated (in various points of the source and at different times) waves having different wavelengths, a concept that lies beneath what we call color; different wavelengths correspond to different colors.

As a result, such light is incoherent (both spatially and temporally) and it is said to be caused by Spontaneous Emission. Its color, depending on the cumulative effect of the wavelength distribution of the single elementary points of the source, is perceived by the human eye, broadly speaking and in the most general case, as white which turns out to be the sum of all colors of the visible spectrum, as anybody who has ever seen the cover of Pink Floyd's 1973 album The Dark Side of the Moon knows.

The way I look at it is the following: think of a complete Orchestra in a great Concert Hall. If players sit wherever they please and choose to play the music piece they like the most, starting at an arbitrary, uncoordinated instant (i.e., spontaneously), the result is that we music lovers sitting in the audience can perceive only an unpleasant dissonance. That is the equivalent of white color.

Laser light on the other hand shows a very high degree of spatial and temporal coherence, thanks to the way the beam is generated, and this forces it to have a specific "color". In some cases this color is clearly visible (laser pointer, for example) while in others it cannot be actually

seen by the naked eye because it is beyond its ability to do so (as with Virgo's infrared — i.e., whose wavelength is slightly below the one we call red — laser).

Going back to our musical analogy, in this case our players are sitting exactly where they are supposed to, the music they play is agreed on beforehand and their actions are synchronized and coordinated (i.e., stimulated) by the Conductor, so to deliver their powerful performance to the full.

Now it would be reasonable to ask why in Virgo we use a laser in the first place. Basically, in order to detect gravitational waves, we must be able to measure how much a given (long) distance changes and, if it does, how small is the change (it is going to be *very* small).

Intuitively, if we use a small "unit" to quantify the length, i.e. a tool whose length is much shorter than the distance we want to measure, it is easy enough to verify how many times the small unit fits in the huge distance (a few kilometers in our case) and, if the latter changes, of how many units the change actually is. The unit we use is the already mentioned wavelength which, for lasers, is very small—an essential quality for our purpose. In Virgo's case it is about one millionth of a meter. In addition lasers produce very intense parallel beams of billions and billions of identical photons and each of them takes a measurement of the unknown length: the larger the number of measurements taken, the higher the accuracy achieved. This feature represents a notable selling point in favor of the choice of using a laser in the attempt to detect gravitational waves with our antenna.

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[1] This is a two-part story, the first regarding the laser's physics and the second about cultural stereotypes.

In 1959, two years after the acronym was coined, a physicist named A. Schawlow observed that in reality the beam is produced bouncing photons back and forth in a cavity (sound familiar?). Therefore instead of speaking of Amplification it would have been more appropriate to refer to it as an Oscillation, from which the word LOSER would stem. As for the cultural stereotype now (which did not go unnoticed by Schawlow, of course) the problem is that in the great US of A, a country in which, as someone said "the bottles of ketchup must be always full to the top", loser is an adjective used to stigmatize people affected by the mortal weakness of not being built to become successful in life, and to call somebody a loser is intended as a slapping offence at the same level of telling someone that his/her partner sleeps around with other people in Mediterranean, melodramatically-inclined countries.

The word LOSER was therefore, obviously, set aside.

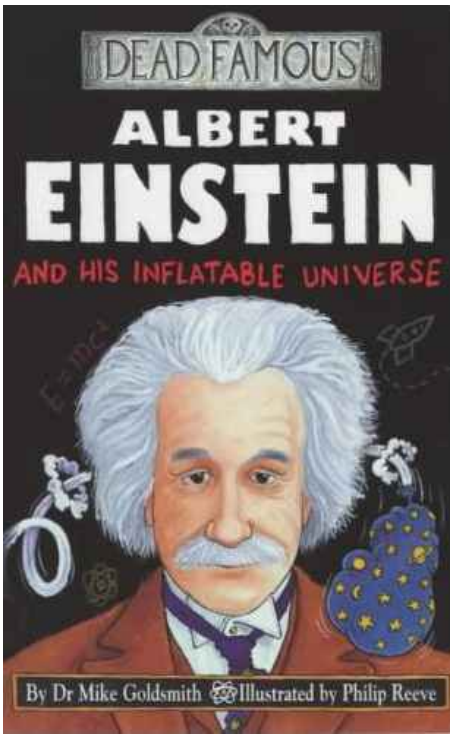
F. NOCERA

Science Learning can be Fun!

One of the nicest things in having children is that you can take a look at the literature for kids and teenagers. A few weeks ago I bought a book for my 12 year old daughter Lidia: "*Einstein e l'universo gonfiabile*". It is a book translated from english (Einstein and his inflatable universe); I learnt on Google that the author, Mike Goldsmith, has a PhD in Astronomy, but is essentially a science writer for young readers. This book is one in a series of biographies of ancient characters, such as Cleopatra and Henry VIII; it is called "Dead Famous" (the Italian side is named "Il morto che parla": the talking dead man).

My curiosity was high, so I read it as soon as I had the time. What a difference with the books of my age, usually boring and too obviously didactical. I must admit that I don't have a large knowledge of this kind of books, but when I was a teenager I read some books about fusion and biology, and they were not much different from the usual schoolbooks, they were meant for learning, not for amusing.

When I read this book, I found it fun and pleasant. It is 50% on Einstein's biography and the other 50% on his thoughts in physics. It is a mixture of standard text and



cartoons; this trick helps make difficult sections simpler by using funny pictures. With the trick of examining Einstein's private lost notebooks, the writer summarizes the typical way of thinking of a physicist; just to give an example in this way, it is expressed the fact that good theories are usually simple and beautiful.

Old colleges are described, all things Einstein hated with all the rules that could not be followed by modern students, and in general a lot of care

is used in explaining things closely related and interesting for teenagers.

Half of the book is devoted to explaining some fundamental physical concepts, as time for instance or the photoelectric effect, which gave the Nobel prize to Einstein.

In fact, he is very famous for his General Relativity, but his Nobel prize was "for his services to Theoretical Physics, and especially for his explanation of the photoelectric effect".

In the examples the extreme case of people moving at the speed of light is used, in order to stress the fact that usually we think following our everyday experience, considering it as generally applicable, while it is only a special case of a more general world.

The most famous of Einstein's equations is written in a picture as a formula on the blackboard. Einstein is depicted as a man completely concentrated on his thoughts: even when he worked outside the academic world he was constantly thinking. His efforts on helping the Jewish escape Europe during the second world war and his use of powerful people, who were friends to him, such as the king of Belgium, are described in the book, as his fight with Bohr, since he didn't like quantum mechanics. The atmosphere in which he was used to work is evident, as clear is the fact that he was absolutely conscious of his value: he had promised to his divorced wife the money of his Nobel prize years before his nomination. A lot of care is used to keep the teenagers attention: the macabre title "dead famous" comes clearly from the fact that young people like the dark atmosphere, but there is just nothing that could be barely defined "macabre" inside the text.

In short, the book is nice to read for adults as well. Of course we will not learn general relativity, but it provides general concepts necessary for its understanding. With satisfaction I have realized that finally books for the young are written with the aim of amusing, without assuming that science has to be necessarily boring. Even on a sunny beach, reading a book like this is surely more fun than most magazines specialized on gossip.

At the end I asked my daughter: "Lidia what has impressed you most in this book?"

"…the fact that the absolute rest doesn't exist!" was her answer…she always complains that she would like to sleep more…

A. DI VIRGILIO

2nd EGO-Virgo Biathlon

On Tuesday June 6th, 2006 members of EGO and of the Virgo collaboration had a new challenge on the interferometer site: the Second EGO-Virgo Biathlon Relay Run! The first edition took place in May 2004.

Eight teams each composed of five members were at the starting blocks to run distances ranging from 1 to 3 km along the interferometer arms, either on bike or by foot. Despite highly motivated competitors, the Naples team was able to reach the finishing line first, once more,

followed by the Electronics & Operators and Locking groups. The cover picture of this first h-issue shows the winning team receiving the "gold" medals.

After the biathlon, a buffet organized by EGO was offered to the athletes to recover from their efforts and to non-athletes (colleagues and spouses) who gave encouragement to all the teams!

Here are the official results of the 2006 biathlon: 1 – Napoli, 2 – Electronics & Operators, 3 – Locking, 4 – EGO Optics, 5 – EGO Software, 6 – Infrastructure Dream Team, 7 – Vacuum et al., 8 - LAL.

Let's thank the organizer of the event, Carlo Bradaschia for such a good initiative!

S. PERUS, EGO
PHOTOS: E. MERCATALI, M. PERCIBALLI

GOOD NEWS!

Two very nice events have recently taken place:

***Francesco**, Massimo D'Andrea's son was born on May 5 at 11:00.*

***Luca**, Irene Fiori's son, was born on May 28 at 00:27.*

Congratulations and welcome to both of them!

An Authorized Interview with Nelson Christensen

Nelson, you arrived here in Virgo in summer 2005, to work in Virgo data analysis. You spent here one sabbatical year, and now you are going back to your university of Minnesota, where you are a professor of physics at the Carleton college, working also in analysing the data of LIGO. Since you are leaving now, you can tell the whole truth, so I would like to ask you some short questions. Let's start from:

Why did you decide to come to work to Virgo?

I've been working on the LIGO data for a long time from my university, but it's not the same thing as working on a site: if there are questions or problems to be understood and solved, you have to be close to the detector. For this reason I wanted to work on the site of an interferometer, and I had the opportunity to choose between Hanford, Livingston or Pisa. I decided for the easiest solution.

On which specific sector have you been working?

In the USA I've mostly been involved in the inspiral sources data analysis group, a little in the periodic sources group, mostly as a referee in stochastic, almost not at all in burst analysis. So I really appreciate the possibility I had here in Virgo to work on the latter subject, which implies a lot of work on the field, looking at sensors, placing them, trying to debug the problems, and so on. I enjoyed a lot the work I did here with the people involved in this item.

Do you think that the approach to this activity is similar in Virgo and in LIGO, either from the technical/scientific or organizational point of view?

I think that, in particular as far as the on site noise investigation is concerned, the approach is quite similar, even if maybe LIGO, having data available since a longer time, is somehow more used in analysing data and in applying some procedures, which Virgo is learning fast now. By the way, either in the techniques and in the organization, things are very similar in both experiments.

What do you think about the level of collaboration and exchange of information between LIGO and Virgo?

Things are going quite well, mainly in the very last years, and will surely improve in the near future. People are starting to get to know one another, and there is respect and acknowledgment of each other from every point of view. Differently from other high energy experiments, people are aware that GW research is extremely new, techniques are not established and standardized and everything is extremely difficult. Therefore, everybody understands that competition in this phase will not pay, whereas collaboration, on the other hand, is fundamental for everybody. Moreover, owing to the extreme uncertainty of a possible GW measurement, it's clear that a confirmation of an event by an experiment that's very different in its technical design and by a data analysis lead by completely different people with different approaches would be almost the only evidence of the correctness of the result. I think that's perfectly clear to everybody working in this field at the moment. This doesn't hold only for the data analysis: as an example, the solution of the thermal problems Virgo is now facing will be sped up a lot by taking advantage of the experience developed in LIGO over several years.

What do you think is important for Virgo at the moment?

Of course the most important thing for Virgo is to approach the design sensitivity. People will feel much less frustrated when real data of scientific relevance will be available also from Virgo. I'm sure that also the internal relationship between people will improve: everybody will be much too busy in analysing data to have time to waste in a fighting and disputing. That's the same everywhere.

What did you most enjoy of your period spent in Virgo?

First of all for me it was a big relief not to have to teach. In my usual

university life, when I have three-four hours to dedicate to my studies, this is already a great research day. Here I could spend the whole day in working for research! And, instead of teaching, there has been a lot to learn. It is true, I could hope to see the interferometer fully working and have fresh data from a Virgo run to analyse, but there has been a lot of work to do anyhow.

In addition to this, the human environment is great. There are a lot of very nice people, very well prepared and of very big competence. It has been a pleasure to work with people like these. Moreover, both the Italians and the French are quite "warm", which doesn't necessarily mean they are always joyful and nice …

And what about our meetings?

There are surely too many, even if not so much more numerous than in LIGO. I think that in particular the collaboration meetings could be less frequent: one every other month would surely be sufficient. Each collaboration meeting lasts one week, people spend one week in preparing themselves for it, and then one week to recover! It's surely does no good to the laboratory activity.

On the other hand, I like very much the daily meeting, which really gives the pulse of the situation, even if, also in this case, it would be wise to stay always within half an hour. Another suggestion I would give, concerning the meetings, is to switch off the wireless during the presentations. But that's the same recommendation I would do to every other experiment, in LIGO it's the same.

And, apart from the working side, what's your impression of life in Europe, and of course in particular in Italy?

I have enjoyed a lot my stay in Italy. I have felt perfect in Italy and in particular in my everyday life in Pisa. My children have been at an Italian school, and they have been sort of adopted by their teachers and classmates. They have been very happy, they speak Italian very well and we feel partly Italian. I also like Italy a lot, and in general Europe.

I have been to a lot of places, Rome, Venice, Florence, skiing in Val d'Aosta. As I said, people are warm, the climate is very good, food is excellent, the landscape and the towns are beautiful, Italians drive crazy, the same good things everybody says when coming to Europe and Italy. All my colleagues are very jealous of the year I spent here. I will advertise so that many of them will be eager to come to work at Virgo.

Very well, and I see that your Italian is very good. So I'll come to you later to correct my English translation. I would like to ask you a lot of questions still, but unfortunately I've to go to a meeting. I hope that next time it will be you to interview one of us for your equivalent LIGO newsletter. So I have to thank you very much and wish you all the best.

But, as a very last question: do you think we will go the distance?

Sure. To the horizon and beyond.

P. LA PENNA

h-reporters spotted the tired stork resting nearby the Virgo road after the double baby delivery...

FELLOWS AT EGO

"I arrived at EGO two months ago coming from a very different field of physics. With an engineering degree in my pocket, I began my career in 1996 in a defence laboratory located at Gramat, a beautiful region in the south west of France (nice meat: foie gras, duck, and nice wine: Cahors, Bordeaux; a perfect start).

I took part in a very challenging project for the design and construction of a powerful X-ray source using high pulsed power technologies, starting practically from scratch. I started work on a basic element of the generator and then switched to the pulse forming section of the facility by studying power amplifiers that use plasma. As those elements were not well-known, and are still not well-known, I took advantage of this opportunity to complete a thesis in this field in 2004. I was then asked to design and install soft X-ray spectrometer (1 keV domain).

During these 10 years of exciting work I got the chance to work with several foreign laboratories and especially with the Sandia National Laboratories (Albuquerque, New-Mexico, USA) and the High Current Electronics Institute (Tomsk, Siberia, Russia). I then spent some time in these nice places (nice, but in a different way) in particular in a fine skiing village at Taos Ski Valley near Albuquerque (I recommend it for advanced skiers) and in Tomsk where you pass directly from the winter to the summer (that is you arrive with a winter coat and you leave in T-shirt 2 weeks later).

So you could ask, why the change of orientation? In 2005, the facility I was working on, was finishing its commissioning phase and starting its operating phase; so it was a good time to change and moreover, for some administrative reasons, I could no longer stay in Gramat. In this context, the fellowship at EGO appeared to me as an interesting challenge coupled with a potential international experience. So, with my wife, we did not hesitate too much and we decided to take advantage of this opportunity to move with our four children to Italy.

Now I feel I am starting from scratch again (almost as though I have pressed reset), and am trying to learn as fast as possible all the features of this detector in order to help quickly and do an efficient job during the commissioning phase."

Dominique Huet

PERSONNEL MOVEMENTS
01 March - 31 May 2006

ARRIVALS

Staff

Slim Hamdani
Applied Physicist,
Interferometer Operation (Optics)

Collaborators

Dominique Huet
Comissioning Project

DEPARTURES

Staff

Dario Vannozzi
Technical assistant for the operation of the interferometer, Interferometer Operation (Operations)

Fabio Bronzini
Computer support, Computing

Olivier Roques
Software Engineer, Interferometer Operation (Software)

Collaborators

Sandra Dour
Administrative assistant

JOB ANNOUNCEMENTS

VESF (EGO-Supported) Postdoctoral Fellowship on Gravitational Wave Data Analysis
Laboratoire Astroparticule et Cosmologie (APC),
University of Paris 7 Denis Diderot, France
http://www.apc.univ-paris7.fr/APC_CS/Recherche/Adamis/

Interferometer Operator
European Gravitational Observatory (EGO)
Cascina, Italy
http://www.ego-gw.it