THE GRAVITATIONAL VOICE

number 20

NOVEMBER 2011

The European Researchers' Night

In this edition:

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

On the 31st October the world population officially exceeded 7 billion people. This impressive number stimulated some lazy meditation in my mind. This meditation was supported by the existence of several web sites which can calculate the world population at any given date (e.g. http://populationaction.org/Articles/Whats_Your_Number/).

I asked myself how many people were on this poor planet when CNRS and INFN signed the agreement to build Virgo, on June 27 1994 (the answer is 5,644,310,985). This means that since then the population has increased by 19% and there are 2 billion new people.

Continuing on this line we can tell that when the oldest Virgo member was born around 1940 (guess who he is), the population was about 2.30 billion. When I was born in 1944 we numbered 2.34 billion. In 1987, when the Superattenuator prototype located in the Main Building hall was built (and probably the same year the youngest Virgo undergraduate student was born) we numbered 5 billion. When ET is here (not Spielberg's ET, but our Einstein Telescope) in 2025, we are expected to be close to 8 billion.

Returning to person number 7,000,000,000. If this person was born in Europe, USA or Japan, it is estimated that he has more than a 50% probability of exceeding the age of 100.
My intention is not to derive any philosophy from this but to share with you this information for fun.

C. BRADASCHIA
Editor-in-chief

Cover picture: the poster of "Big Bang", the monologue of the 2011 European Researchers' Night.

The job of Spokesperson at Virgo

In the Virgo Collaboration, the 'Spokesperson' (SPKSP) is elected by the VSC. He/She gets his/her legitimacy from the Collaboration as a whole. The Spokesperson is not appointed by the EGO Council, nor by the EGO direction, and is therefore, a representative of the physicists of all of the Virgo teams, not of their institutions. He/She nevertheless keeps in mind that the big boss, are the populations of the countries involved in Virgo. Beside these well known facts, the mission of the SPKSP may vary according to the period considered. For instance, being specific, the construction phase of AdV is a specific context, different from that of its definition phase and differentfrom the end of the first Virgo. As such it requires a different attitude. Another parameter is the scientific profile of the SPKSP: the ways of considering the experiment will not be the same for a theory-oriented person as for a technology-oriented one.

All this said, I consider my own role as that of a manager, in the sense of organising the consistency of the efforts, avoiding possible conflicts before a crisis occurs, fostering the expression of all points of view, even if marginal, and trying to optimally exploit the resources of EGO (obviously through a constructive approach with the EGO direction). Of course, this is an ideal, I'm not sure of success each time, but recent decisions, either internal to Virgo or in common with the LSC, have made me rather optimistic. I actually feel everybody is willing to construct (physically and in spirit). An important point is the relationship inside the Collaboration. There is an "Advanced Virgo Project Leader" (AVPL), as well as other people with important responsabilities. The mission of the SPKSP is obviously not to explain to the AVPL how to make AdV, nor to try to force decisions on these other people, and, over all, it is not to fight the EGO Direction. It is rather, in my opinion, to facilitate by any means the progress of our project in due time. We have three years to succeed, and we cannot afford to lose time. I must say that I found Federico Ferrini of quite the same mind.

A central task is to interact with other analogous experiments. There are for instance (sometimes) some differences in the way of thinking between us and the LSC, and efforts are necessary to understand their point of view, and to explain ours in a serene climate. The recent election of Gabriela Gonzalez as the LSC SPKSP was very good news in this spirit. We must also develop cooperation with the British-German GEO group and with the Asiatic groups (India, Japan), as initiated by EGO.

I take the opportunity of this short article to say that I would like that concerns, objections, projects, questions, etc. may be sent to me spontaneously. In this way I will have a feeling of the collective mind of the Collaboration and be able to pour some oil in the gear-box (not on the fire) if necessary.

Jean-Yves VINET, Virgo Spokesperson

The Virgo Science Run 4

Virgo Science Run 4 was started on the 3rd of June 2011 in coincidence with the GEO detector located in Germany next to Hannover and finished on the 5th of September. This was definitely the last scientific data taking using the current optical setup of our instrument before we move to the Advanced Virgo project.

Both Virgo and GEO ran with a good stability and we finished the run with 82 % of science time in Virgo, 83 % for GEO and with 69 % of common science time for data analysis.

Moreover the commissioning team worked during the run to improve the interferometer as much as possible. The horizon for detection of neutron stars coalescence was increased from 11 to 12 Mpc (MegaParsec, 1 Parsec is about 3.3 light-years) and the instantaneous time to reach the maximum possible emission of the Vela pulsar went from 50 to less than 15 days by the end of the run (see figure on the next page and its explanation in the box).

Different teams have already started to analyze the data, in particular the continuous wave group for the Vela and Crab pulsars and the burst group. Thanks to the quality of the data we can expect up to a factor two better in our results compared to the previous analyses already published. The burst group has already started to analyze the data. They are looking at sources without taking into account a preferential direction combining GEO and Virgo detector coherently. We also plan to perform analyses on specific events which happened during the run. 45 gamma ray bursts occurred when both GEO and Virgo were in science mode and we had two supernovae which created some excitement as they were quite close.

The first supernova, in the galaxy M51 at 8 Mpc happened a couple of days before the run but at a time when both detectors were taking good quality data. This event is related to the collapse of a massive star (type II supernova) from which

we can expect gravitational emission in the kHz band. However this event was too far to be detected with our present sensitivity as we can only detect such events up to a distance of 3 kpc (1/3 of the distance to our galactic center). The second supernova happened on the 23rd of August in the galaxy M101 at a distance of 7 Mpc. This time the event was a thermonuclear explosion (type Ia supernova) where the possible emission is even weaker than type II and in a frequency band below 10 Hz.

The final event of the run was the visit of our GEO colleagues during the last week of the run and we exchanged a lot of information on status and experiment done on both sides. We hope to see more such meetings in future years.

Finally I would like to thank all the people involved during the run: the operators who spent nights and week-ends alone in the control room, the commissioning team who improved our instrument, the on-call people and the week coordinators. We are now awaiting for the next step: the first Advanced Virgo science run!

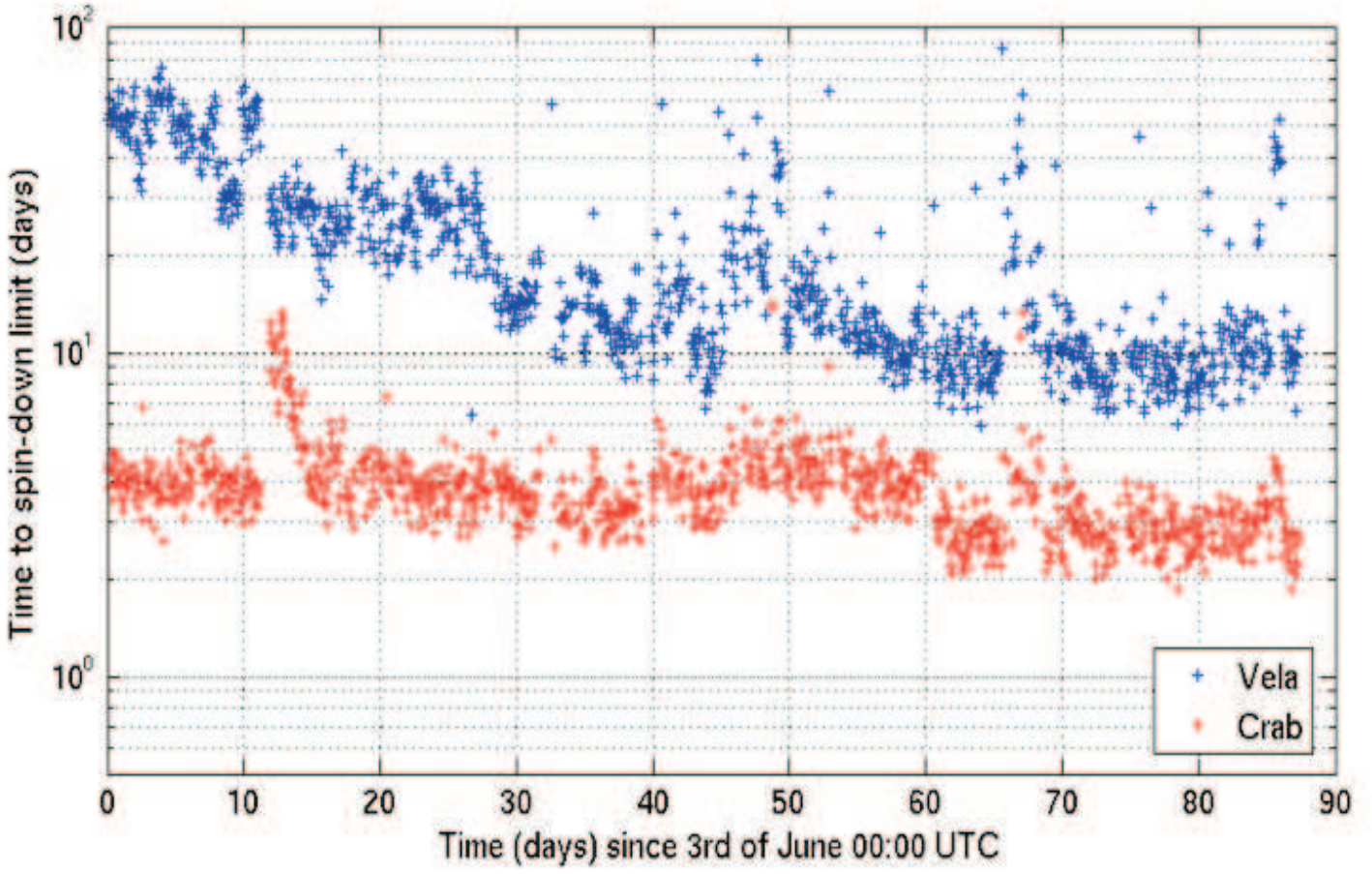
N. LEROY
Run Coordintaor

Pulsar spin down limit

A pulsar is a neutron star whose magnetic axis is not aligned with its axis of rotation. Due to this configuration, strong beams of electromagnetic radiation (EMW) are emitted from the magnetic poles of the star, sweeping the universe like the beam of a lighthouse. It is also expected that the symmetry axis of the mass distribution of the star would be misaligned with respect to the spinning axis, hence generating gravitational waves (GW).

The overall energy loss, due to both EMWs and GWs, can be computed from the observed slowing down of the star spin frequency, assuming canonical values for mass and momentum of inertia of the star. This energy loss constitutes an upper limit to the pulsar GW emission.

Not seeing any GW at the appropriate frequency (twice the spin frequency) we can say that GW radiation by that pulsar is zero, within the error of our measurement. If the error is under the loss amount computed from the slowing down, we can say that we have "beaten the slowing down limit" of that star. The error of our zero measu-rement decreases extending the duration of the measurement. In figure 1 we have plotted, at every moment, how many days of data we have to integrate to reduce the error below the limit. The sensitivity improvement through VSR4 is clearly visible for both Vela and Crab Pulsar; gravitational radiation is expected at about 22 and 60 Hz, respectively.



Andrea on Air

Our friend Andrea Viceré was guest star on September the 29th at Primo Piano, a daily transmission on Punto Radio, a local Cascina station. They started with the mayor of Pisa talking for 15 minutes about the great success of the new IKEA store, which is to be built near Pisa soon. The remaining 45 minutes of Primo Piano were devoted to asking Andrea a little bit about gravitational waves and a lot about the physics of the moment: superfast neutrinos and their consequences. Andrea was great: clear and authoritative.

C. BRADASCHIA

Striking news: Neutrinos faster than light

We asked our colleague Eugenio Coccia, director of the Gran Sasso Laboratory from 2003 to 2009, the period during which the Opera experiment was installed and started taking data, to comment on the striking news about neutrinos travelling faster than light.

***h:* Eugenio, what will have to be changed in our picture of the world after the discovery by the Opera experiment?**

E.C.: Well, first of all let me say that I am reluctant to accept this result without an independent confirmation. Lorentz invariance is such a pillar, also experimentally, in our model of the physical world, that its questioning requires special caution. If confirmed, these results once more put the neutrino under the spotlight as a very special particle. Neutrino masses are much smaller than those of the other elementary particles, strongly indicating that their masses are not due to the Higgs mechanism but, possibly new very high-energy mechanisms. Are these mechanisms responsible for possible "shortcuts" in spacetime? Is there a sterile neutrino? If confirmed, our picture of the world will certainly change, but is too early now to infer its new shape.

The Cherenkov Telescope Array

by the CTA Consortium

1. Imaging the Universe

Most of our knowledge about the Universe comes from the observation of electromagnetic radiation from heavenly objects. Starlight is the most obvious example of this radiation. Even with the naked eye, it is hard not to be overwhelmed by the view of the sky on a clear dark night and images generated by modern large telescopes provide an enormous wealth of information for scientists. However this starlight is only a tiny fraction of the spectrum of radiation incident upon the Earth. From red to blue the spectrum of visible light covers just one octave in frequency. The full electromagnetic spectrum on the other hand ranges over approximately 70 decades up to the highest energy gamma-rays. One way to visualise this is to imagine a 15 m wide piano keyboard. Modern astrophysics explores all of this vast spectral range, trying to learn more about our stellar neighborhood, about our own and distant galaxies and about the Universe and its history.

2. Probing the High-Energy Universe with Cherenkov Telescopes

The Universe is full of high energy particles. They come from cosmic bodies such as remnants of supernova explosions, binary stars, jets around black holes in distant galaxies, star formation regions in our own Galaxy and many other violent phenomena. Hunting for such particles can help us to understand not only what is going on inside these very violent phenomena, but also answer fundamental physics questions such as the nature of dark matter and of gravity itself. High-energy particles are hard to trace, but we can reveal their presence by detecting the gamma-rays that are associated with them. Those gamma-rays are the high-energy part of the electromagnetic spectrum. Like their lower-energy cousins X-rays, gamma-rays do not penetrate the Earth's atmosphere but luckily, it is possible to detect them from the ground via the flashes of blue light they create in the atmosphere, known as Cherenkov radiation. These light flashes are very short - lasting only a few billionths of a second - and are far too faint to be detected by the human eye. However, a telescope with a large mirror to collect the light and a light detector with a fast enough response can detect the Cherenkov radiation.

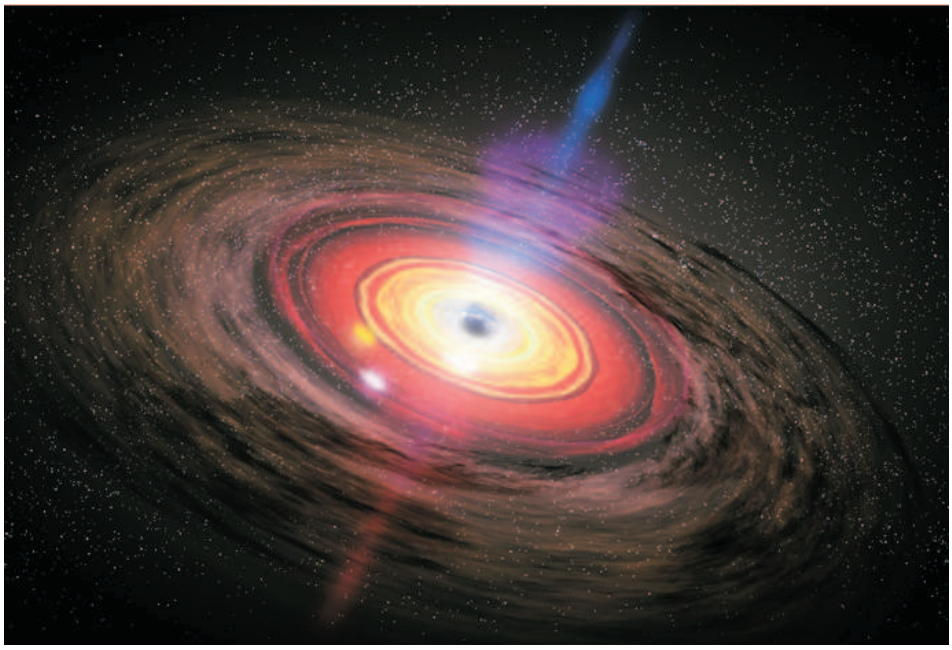
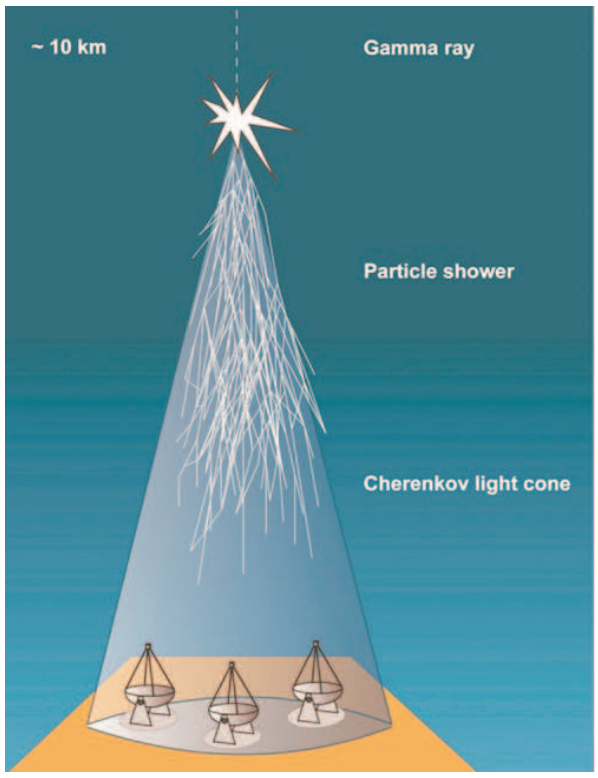


Figure 1: Black holes are thought to be places of intense particle acceleration in the vicnity of jets such as shown in this artistic view. CTA will permit the study of such regions with unprecedented precision.

Figure 2: High-energy gamma rays initiate particle showers in the atmosphere, detectable on the ground thanks to the emission of Cherenkov radiation.



3. What is the Cherenkov Telescope Array?

Current ground-based gamma-ray telescopes such as H.E.S.S., MAGIC and VERITAS have been a breakthrough in imaging using atmospheric Cherenkov technique. Our galaxy as well as distant galaxies have been scanned and about 130 sources of gamma-rays have been detected in our galaxy alone. Many different types of source for high-energy gamma-rays have been identified and systematically studied. They have revealed significant insight into the most extreme and violent processes in the Universe.

However, we have now reached the limit of what can be done with the current instruments. Thus, the CTA project is an initiative to build the next generation ground-based very high energy gamma-ray instrument, with an array of dozens of telescopes. It will serve as an open observatory to a wide astrophysics community and will provide a deep insight into the non-thermal high-energy universe. CTA will offer an increase in sensitivity of between a factor of 5 and 10 over current instruments and it will extend the energy range of the gamma rays observed. It is expected that the catalogue of known very high energy emitting objects will increase from 130 to over 1000, so we can expect many new discoveries in key areas of astronomy, astrophysics and fundamental physics research. It is envisaged that CTA will consist of a southern hemisphere array, aimed at observations of Galactic sources and a Northern hemisphere array, optimised for extra-galactic observations. The Southern hemisphere array will be designed to make observations across the entire energy range.

4. Techniques and challenges

CTA will achieve its unprecedented level of sensitivity to gamma rays of energies from below 50 GeV to above 100 TeV by using telescopes of threesizes, covering the low, intermediate and high energy regimes. The lowest energy photons (up to 1 TeV) will be detected with a few large telescopes of about 24 m diameter. Intermediate energies, from around 100 GeV to 10 TeV, will be covered with about 25 medium-size telescopes of 10 to 12 m diameter. Gamma rays at the highest energies (1 - 300 TeV) produce so many Cherenkov photons that they can be easily seen with small (4 - 6 m diameter) telescopes. However, these extremely energetic photons are rare, and a large area on the ground (1-10 km2) must be covered, requiring many small telescopes (30 - 70), to achieve the required sensitivity.

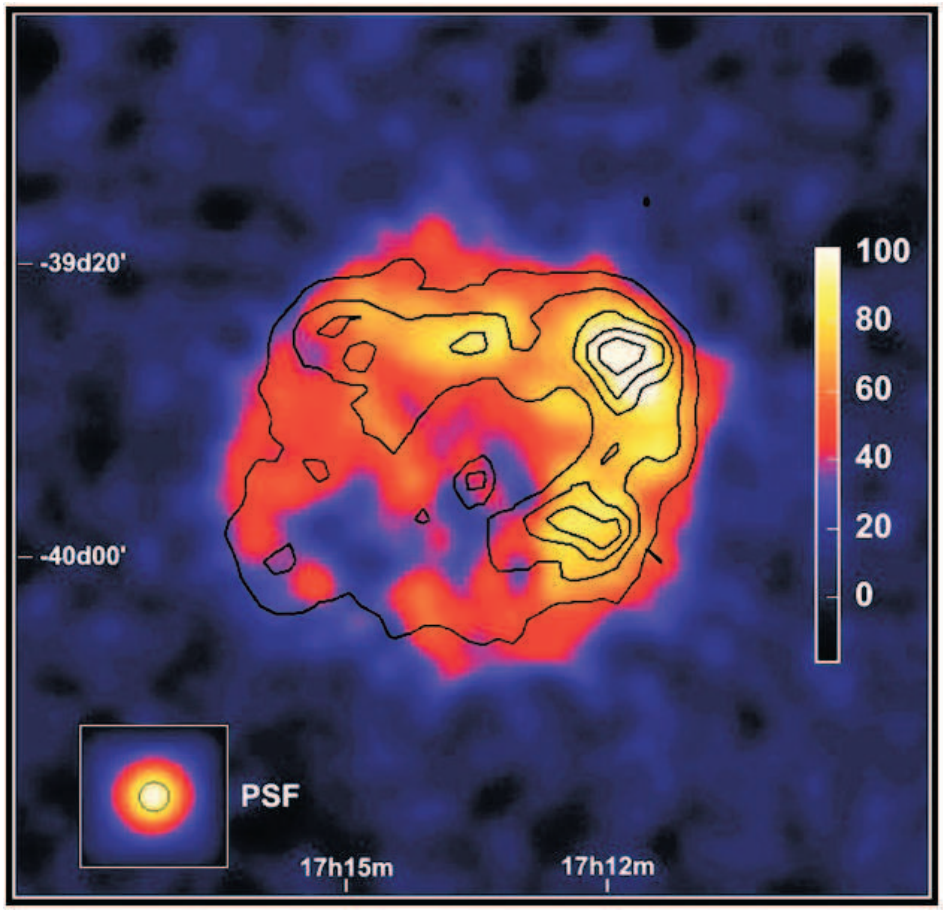


Figure 3: A supernova remnant as seen in gamma rays with a Cherenkov telescope, showing regions of particle acceleration processes.

The members of the CTA Consortium have ample experience of constructing and operating telescopes of sizes similar to the different telescopes of CTA. The main challenge for these telescopes therefore lies in the industrialisation of all aspects of the production and the exploitation of economies of scale. However, new dual-mirror designs for some of the telescopes are also considered, and these provide particular engineering challenges in the design of the structures, the mirrors and the cameras.

The largest number of Cherenkov telescopes that have ever been built and operated at one time so far is four. CTA's southern array could have as many as 100 telescopes. Building and operating so many instruments together requires a level of co-ordination that is unprecedented in this scientific field. Some 800 scientists from 25 countries around the world have already come together to build the Cherenkov Telescope Array. The CTA Project is currently in its preparatory phase, which started in 2010 and will last for 3 years.

During this time, prototype telescopes and telescope parts are being built and evaluated. The administrative structures necessary for the smooth operation of the array are being created, and the sites are being studied using long-term satellite weather archives and specific monitoring.

The construction of CTA is expected to start in 2014.

More information on CTA can be found at: www.cta-observatory.org

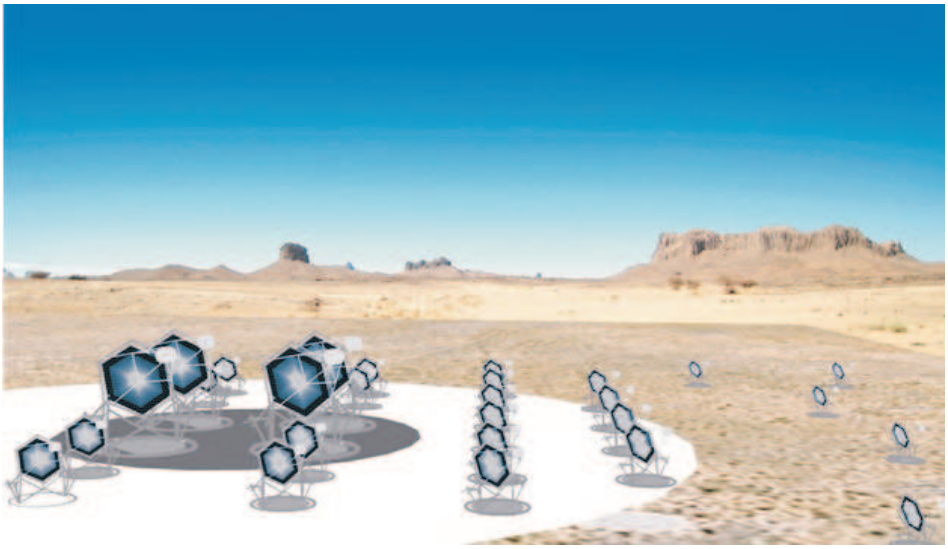


Figure 4: Artistic view of CTA. The Cherenkov telescope array will be composed of telescopes of different sizes permitting the detection of gamma rays at different energies.

ET next steps

The Einstein gravitational wave Telescope (ET) design study was concluded at the beginning of July. The final conceptual design document was released (https://tds.ego-gw.it/ql/?c=7954) and the long list of financial and scientific reports have been prepared over the summer and were sent to the European Commission at the end of September (thanks to Veronica and Virginie!). Now, what are the next steps for ET?
As stated several times, the current priority for the GW community is to build and put in to operation the advanced detectors and then the third generation activities should continue in background the, preparing the technology, the ideas and the political support, to be ready, in 6 - 7 years from now, to start the ET construction adventure. An important step in this direction has been achieved in the last few days. A European (FP7-IRSES) proposal, ELiTES, submitted to the European Commission in January 2011 has been positively evaluated and has now entered the negotiation phase.

A 4 year-long project, it involves the exchange of scientists between Europe and Japan in support of the development of cryogenic technologies for the ET and LCGT observatories. ELiTES (acronym that stands for 'ET-LCGT Telescopes: Exchange of Scientists') involves the University of Rome 'La Sapienza' and Sannio (Italy), the Friedrich-Schiller University of Jena and MPG (Germany), Nikhef (The Netherlands), Glasgow University (United Kingdom) , the Institute for Cosmic Ray Research of Tokyo (Japan), and is coordinated by EGO. If the negotiation phase concludes positively, ELiTES will start at the beginning of March 2012.

M. PUNTURO
ET Scientific Coordinator

Cooking in the Roman ages

We conclude the series of recipes of centuries gone by with one about two millennia old. It is attributed to Apicius Coelius, whose existence is not absolutely verified as he may have just been a personification of the ideal cook in the Roman ages. We refer our readers to Wikipedia for further information.

APICIUS COELIUS: Foods and Dressings or the Art of Cooking (10 chapters)

Chapetr VIII: QUADRUPEDS
Section VII: THE PIGLET

The Greengrocer Piglet

The greengrocer piglet must be boned through the throat and becomes like a goatskin. Fill in with the chopped meat of a chicken; add a few thrushes and warblers, some chopped meat of the piglet itself, sausages, pitted dates, scilla bulbs, snails without shells, mauve and chard leaves, leeks, celery, boiled cabbage, coriander, pepper grains, pine nuts; moisten with fifteen eggs and peppered liquamen (1), add chopped boiled eggs; sew the aperture. First boil the piglet then roast in the oven. To serve cut open the back and dress with the following sauce: pepper, rue, liquamen (1), raisin wine, honey, little olive oil boiled all together and thicken with starch.

Notes:

(1) Liquamen was a very popular condiment obtained by fermentation of fish or fish innards, very similar to another one called garum, or just a different name for it.

ORIGINAL RECEIPT

APICII COELII : DE OBSONIIS ET CONDIMENTIS SIVE ARTE COQUINARIA (Libri Decem)

Liber VIII: Qui tetrapus appellatur
Caput VII: In Porcello

In porcellum hortolanum

Porcellus hortolanus exossatur per gulam in modus utris. Mittitur in eo pullus isiciatus particulatim concisus; adjiciantur turdi, ficedulae, isicia de pulpa sua, lucanicae, dactyli exossati, fabriles bulbi, cochleae exemptae, malvae, betae, porri, apium, coliculi elixati, coriandrum, piper integrum, nuclei; ova quindecim superinfunduntur, liquamem piperatum, ova mittantur trita; et consuitur, et praeduratum in forno assatur. Deinde a dorso scinditur, et jure hoc perfunditur: Piper teritur, ruta, liquamen, passum, mel, oleum modicum; cum bullierit, amylum mittitur.

C. BRADASCHIA

Figure 1 depicts the remains of a Roman liquamen factory, in Spain. This kind of condiment is still used today in Italy and is named "colatura di alici" (anchovy leakage). In the Asian far east it is known as "fish sauce".

Figure 2 shows a modern Vietnamesefish sauce factory.

ASPERA Workshop

On Thursday the 20th and Friday the 21st of October, the Second ASPERA Technology Forum took place at the Virgo site, supported by EGO and by ASPERA, a consortium of European research institutes. European scientists working to develop future gravitational wave detectors (advanced Virgo, GEO-HF, Advanced Ligo and ET) and future high energy cosmic rays detectors (CTA) met together, to discuss with representatives of the industrial leaders in the production of optical components and lasers.

The aim of the workshop was to bring together scientists and companies that have an interest in the markets in these areas and to strengthen the cooperation between stakeholders from industry, astroparticle physics projects and funding agencies, and to discuss and conclude a new collaborative approach for technological developments. A few stands were available for the companies to present their catalogues and products. The success of the initiative is demonstrated by the picture showing researchers visiting the stands.

M. PUNTURO
Member of the ASPERA organising committee

Links:
2nd ASPERA Technology Forum: http://agenda.infn.it/conferenceDisplay.py?confId=3883
ASPERA:
http://www.aspera-eu.org/

Photo below taken during the forum, showing the visitors' participation.

2011 European Researchers' Night

The EGO/Virgo European researchers' night concluded on

Saturday 24 September with an enthralling monologue by the author Lucilla Giagnoni at the Palazzo dei Congressi in Pisa.The theme touched all the most important and surprising aspects of modern physics, alternating with the most emotional parts of Shakespeares work. The ability to address with correctness even the unressolved scientific questions proved very informative to us.

More than half of the 400 strong audience actively participated in the following debate which ran until after midnight.The night concluded with a final drink and warm bids of *arrivederci*.

Saturdays event was the first of series of four dealing with art and science, which the European Gravitational Observatory (EGO) along with the CariPisa foundation intends to offer to the public in the following months.

To mark its third participation in the European researchers' night, EGO invited visitors to its site on Friday 23 and Saturday 24 September to show them the details of Virgo. In addition to the site visit a laboratory was organised were a small group of students from one *scuola superiore* were guided to construct a 100 € interferometer. This interfometer is a functioning Virgo model, constructed of common low-cost materials. The completed model was presented to the students to bring home to their own institute. A second group was also foreseen but this did not occur due to organisational issues.

Friday night also ran until after midnight because of the astronomical observations guided by the friends of the amateur Pisan astronomer "G. Galilei" and carried out using their wonderful instruments and the telescope put at their disposition by the "Limonaia – Scienza Viva".

Numbers were extremely encouraging. There were over 100 visitors on both Friday and Saturday afternoon. Over 150 participants took part in the astronomical observations and the audience was nearly 400 for the theatrical spectacle and the following discussion. The expression on the faces on the participants at the exit, to our not altogether impartial eyes, seemed satisfied and often enthusiastic.

This success was thanks to a small group of enthusiastic friends: Valerio Boschi, C.B., Gian Carlo Cella, Massimo D'andrea, Vincenzo Dattilo, Giuseppe Di Biase, Carlo Fabozzi, Franco Frasconi, Carlo Magazzu', Andrea Matteini, Federico Nenci, Federico Paoletti, Diego Passuello, Séverine Perus, Mauro Tonelli and, last but not least, Federico Ferrini.

C. BRADSCHIA
Outreach Coordinator

Biathlon 2011

This year's biathlon took place, as usual, on the occasion of the July Virgo Week, giving to a maximum number of people the occasion to participate. A thunderstorm was menacing to break loose at any moment, but fortunately it was polite enough to wait until the competition was over and everybody had found shelter (and delicious food) in the canteen. The winners were, needless to say, the locking group, whose daily training in the control room seems to make them invincible. However, LMA was second by just a few seconds, and (unverifiable) rumours had it that on a short stretch Paolo himself had been overtaken; so next year's biathlon will be thrilling. Also the newly constituted Nikhef team succeeded in winning a place on the winners' podium. The 2011 best time was improved with respect to 2010 (see *h*16); was it the menace of the thunderstorm or the attraction of the buffet that spurred people on to give their best? This year, the run didn't cover the whole 3 km length of each arm, but only 2950 m in order to not disturb the ongoing VSR4 science run; but that alone cannot account for the difference. Whatever the reason, next year will show whether the trend is confirmed!

H. HEITMANN

Everything under control (photo: M. D'Andrea)

2011	David's Angels		Locking		Virgones (LMA)		OpticHiens		Nikhef		Mavericks	
1km	Elena Cuoco		Bas Swinkels		Massimo Galimberti		Richard Day		Caela Barry		Fabrizio Rossi	
2 km	Severine Perus		Enrico Calloni		Benoit Sassolas		Marie Kasprzack		Mark Beker		Carlo Bradaschia	
Bike 6km	Gaelle Parguez		Paolo Ruggi		Romain Bonnand		Eric Genin		Marek Szczepanczyk		Franco Carbognani	
3 km	David Miller		Gabriele Vajente		Laurent Pinard		Julien Marque		Mathieu Blom		Federico Nenci	
Number	6	5	1	1	2	2	5	4	3	3	4	6
Time	23:01	42:22	18:03	35:13	18:04	35:44	22:26	41:05	19:27	39:16	22:19	43:57

The Locking team, winner of the biathlon 2011 (Photo: M. Perciballi).

Safety in the Advanced Virgo era

Virgo will soon enter in its "advanced" phase and we can expect a lot of activity in the experimental buildings in the next years. There are many time consuming and difficult tasks ahead especially in the central building, tasks like the dissasembly of metallic and electrical parts and the installation of new parts. Such works are covered in Annex X of the Italian Decree in matter of health and occupational safety ("Decreto Legislativo 9 aprile 2008, n.81"). As EGO is established under the Italian law, it shall respect the rules linked to such activities, particularly the necessity to open a so-called temporary construction site ("Cantiere temporaneo").

The duration of the 'Temporary construction site' should be fixed for 2 years considering the following:

- the first 'civil' works on Advanced Virgo should start at the beginning of 2012,
- the last works before the commissioning phase should concern the HVAC relocation which is scheduled for the end of 2013.

Such a construction site requires - by law - mandatory figures who will ensure the smooth running of the construction site:

- the "Committente": the legal representative for the construction site,
- the "Responsabile dei Lavori": the person responsible for the works {only if the "Committente" delegates the relative duties},
- the "Coordinatore per la progettazione": the safety manager responsible for setting up of the safety plan during the project phase,
- the "Coordinatore per l'esecuzione": the safety manager for the supervision of the works during the implementation phase.

Note that the "Direttore dei lavori": the building site supervisor, not mentioned in the DLgs 81/08, is requested due to the type of work to be performed during AdV project (eg. HVAC systems and structural parts of the electrical systems to be registered at the Cascina Town Hall)

The main duties of such figures are depicted after:

"**Committente**": the legal representative of the Consortium, in our case the EGO Director.

"**Responsabile dei Lavori**": suitable person entitled by the "Committente" to represent him and act independently ("poter decisionale e di spesa") within the limit of the duties discharged to him.

"**Coordinatore per la progettazione**": suitable person that prepares the Coordination & Safety Plan during the project phase. The management of the interferences between companies is one of the critical aspects he shall anticipate.

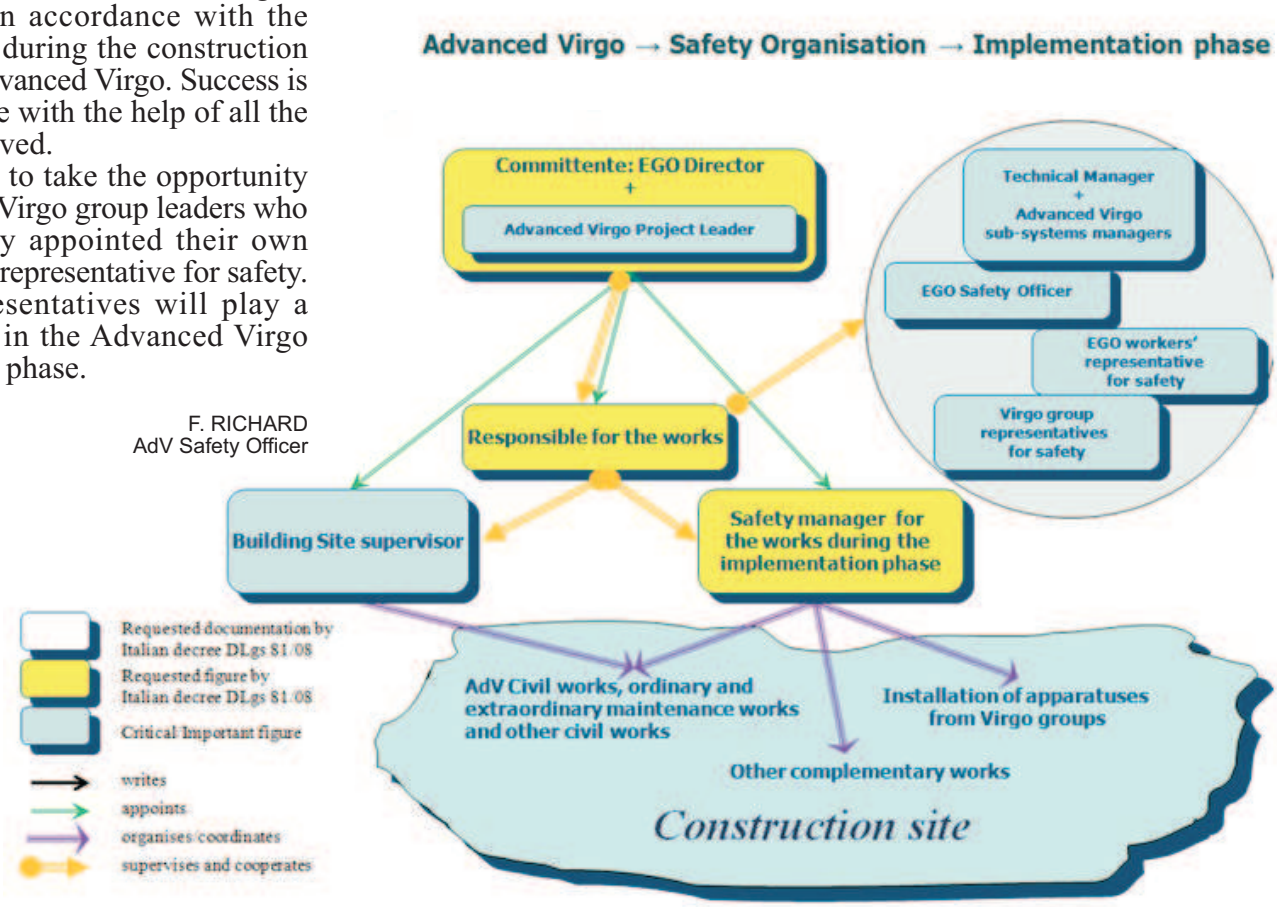
"**Coordinatore per l'esecuzione**": verifies, through the Coordination & Safety Plan and appropriate coordination & controlling actions, the correct enforcement by the contractors and third parties of the relative work procedures.
He is entitled to suspend the whole activity in case of imminent and serious danger.

"**Direttore dei Lavori**": ensures that the civil works are correctly performed, in accordance with the designers/project managers' specifications and in respect of the national good work practices ("a regola d'arte").
In case of non-fulfillment of the above-mentioned criteria by a contractor, he should find appropriate corrective actions. If not possible, he will notify the contractor in writing and provide a copy to the "Committente/Responsabile dei Lavori".

One of the difficulties was to match EGO/Advanced Virgo organizational charts with the temporary construction site configuration and relative hierarchy. A request was therefore made for help from the INFN Prevention & Protection Service based at National Laboratories of Gran Sasso and a legal adviser to create the "most harmonious possible" safety organizational chart for Advanced Virgo project as hereafter depicted:

Even if such architecture may seem heavy and difficult to put into operation effectively it will ensure a correct, safe and smooth running of the works in accordance with the Italian laws during the construction period of Advanced Virgo. Success is only possible with the help of all the people involved.
I would like to take the opportunity to thank the Virgo group leaders who have already appointed their own Virgo group representative for safety. These representatives will play a crucial role in the Advanced Virgo construction phase.

F. RICHARD
AdV Safety Officer

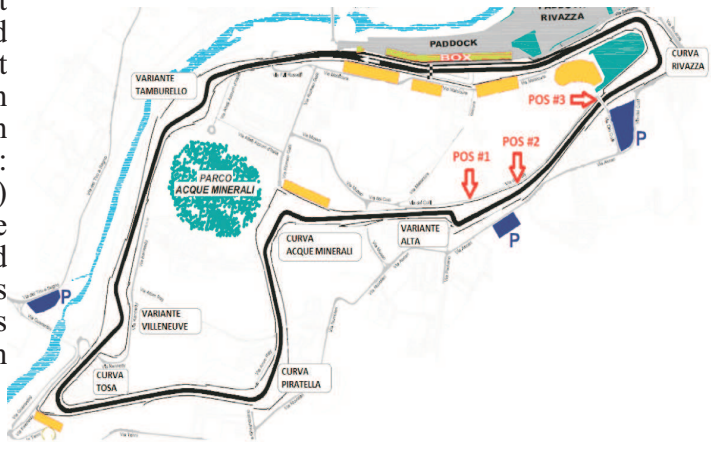


Car racing around Virgo

Electro-magnetic, seismic or acoustic noises generated by heavy human activity in the area surrounding the EGO site can have a negative impact on the sensitivity of the Virgo interferometer. In *h* 10 we illustrated the case study of seismic noise from aero-generators in Pontedera. In view of the future upgrades for sensitivity EGO has committed to preserve the "noise climate" of the site. A preliminary agreement has been reached with local authorities to carefully evaluate the noise impact on EGO of new activities. Thus, a few months ago, Provincia di Pisa notified us that a raceway project had been proposed for construction in the area of Gello, located East of Virgo (map in Figure right).

The speedway track will cover an area of approximately 500x500m2, at a distance of about 5 km from the Virgo North terminal. The speedway would be dedicated to racing cars and motorcycles. The major concern for us is the acoustic noise of race vehicles, particularly low frequency noise components (below 200 Hz). High frequency acoustic noise (audible band, roughly speaking 200 Hz to 10 kHz) at 5 km would be largely attenuated by dissipation effects in the atmosphere, interference with soil, or shadowed by the acoustic screens included in the project. Low frequency acoustic noise (sound wavelengths greater than a few meters) essentially attenuates only by means of geometric spreading because acoustic energy distributes over larger and larger wave-fronts at increasing distance from the source. Low frequency noise may actually be "amplified" in particular meteorological conditions, such as forward winds which could bend sound "rays" downwards creating sound "channel paths" close to ground. Also, the soil between EGO and the proposed speedway is essentially flat and free from dense vegetation or urban areas, thus favoring sound propagation. Race vehicle engines can produce intense low frequency components, but we could find little in literature on the subject.

Thus, we armed ourselves with one sound level meter (and ear protection) and performed measurements of acoustic noise during a Le-Mans-Series car race at Imola Speedway ("*6 ore di Imola*", July 2011). We recorded data in different locations along the race track as illustrated in the figure below. Chosen locations were close to track segments which required different settings for car driving. We expect that different settings would produce different noise emission characteristics. In particular we choose: one position (POS1) located right after the tight curve named "variante alta" as cars cross this position at maximum acceleration.



Another position was along a long straight track section where cars are in acceleration phase. Another position was at the end of the long straight section where cars are at maximum velocity.

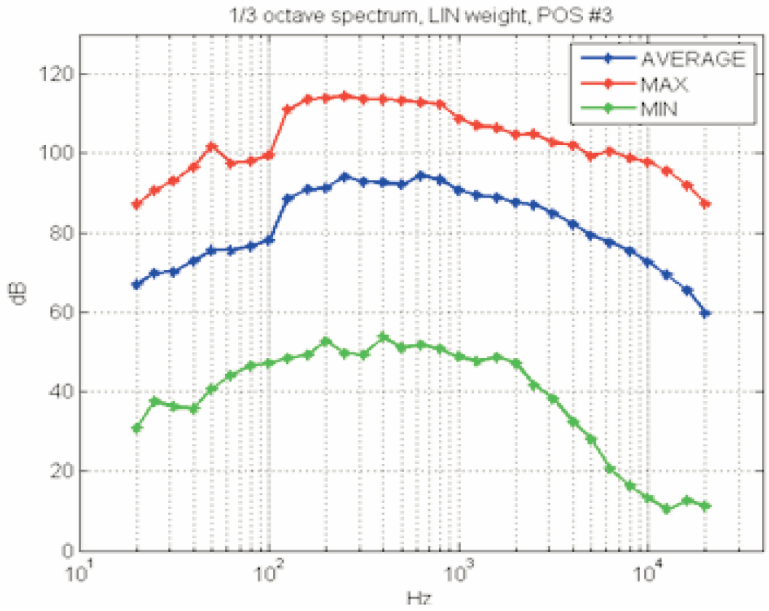
Details of the measurement campaign

Close to track the noise is quite loud. We recorded, in race conditions, an average sound pressure level of 100 dBA, and peak values up to 120 dBA (note, "A" indicates the conventional normalization of sound level to frequency response of human ear). Figure below illustrates a sound spectrum. The low frequency component is most relevant. During the car race we measured an average of about 80 dB at 100 Hz, and peak values (associated to single events) which are up to 20 dB higher.

Pictures above: locations of the measurements

This information is interesting, but not exhaustive. We have attempted an extrapolation of this noise to Virgo, in the case that the new speedway would operate in a similar condition to that measured at Imola. Results indicate that the speedway might significantly worsen the present low frequency acoustic condition at EGO. In the spirit of clarification, and in collaboration with the speedway proponents, we plan a new set of measurements at the Adria speedway. Adria is located on flat and mostly agricultural soil which is similar to the Virgo situation as regards long distance sound propagation. The aim is to perform sound measurement at increasing distances from the speedway during a car race, which we think is representative of our noise case.

I. FIORI and F. NENCI



Picture below: Federico Nenci preparing the measurement tools.

Good news!

Welcome to Luca (left), born on October 6 and congratulations to the Nenci family, Federico, Erica and Luca's brother Diego!

.. and Gary Hemming, our h team member, announced the birth of his daughter Erica (right), born on Monday October 16. Welcome Erica and congratulations to Gary, his wife Annalisa and Erica's brother Mattia!