

## X-RAYS SEE ALL

Don't miss the metrology laboratory's open day on 6 June when its state-of-the-art tomograph will be on display



Mariusz Jedrychowski, member of the metrology team, inserting a sample into the new tomograph (Image: Julien Ordan/CERN)

Having trouble with a detector component? Or you think a key machine component might be getting damaged? At the start of this year, the EN-MME group's Materials, Metrology and Non-Destructive testing section (MM) acquired a brand-new tomograph that offers comprehensive materials soundness inspections for materials and performs accurate metrology. This new, non-destructive testing instrument is used to look inside materials and detect faults (cracks, porosity, inclusions, etc.) or to visualise any internal structures that are not physically accessible. Until now, the MM section had only one, tailor-made tomograph that was solely used to check the LHC magnet interconnections. It had to call

on outside external companies or laboratories to perform tomography-based inspections of materials.

With a penetration depth of approximately 50 mm for steel, 300 mm for aluminium and slightly more for polymers, this new tomograph can be used to test samples up to 430 mm in diameter and 800 mm high, weighing up to 50 kg.

The sample to be tested is placed in between an X-ray source and a CCD detector and then X-rayed from all angles.

(Continued on page 2)

## A WORD FROM LLUIS MIRALLES VERGE

### TACKLING CERN'S PLASTIC MOUNTAIN

As of 28 May, single use plastic cups will disappear from CERN's Meyrin restaurants, saving the planet from 1.5 tonnes of plastic waste per year.

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# A WORD FROM LLUIS MIRALLES VERGE

## TACKLING CERN'S PLASTIC MOUNTAIN

Eight hundred and forty six thousand! That's the number of plastic cups we got through at CERN in 2017. It's a shocking number, and along with our restaurant contractor, Novae, we've decided to do something about it. You'll have noticed over recent months that a number of measures have been taken to reduce the amount of waste produced in our restaurants. A recycling campaign last year was accompanied by the introduction of recycling bins, compostable cups have been introduced for hot drinks, all the soft drinks on sale are in PET packaging to facilitate recycling, and even little things like replacing plas-

tic salad dressing containers with dispensers at the Grab 'n Go are making a difference.

Removing plastic cups from the restaurant is a big move for Novae, and you can help it to go smoothly – both for restaurant staff and for your colleagues. Every day, the restaurants on the Meyrin site cater to some 2000 people. That means that during peak times, restacking the drinking glass dispensers is an almost Sisyphean task – no sooner is the rack full than it's empty again. You can help by limiting yourself to one

glass of water and using water jugs if you're in a group.

CERN already sets a good example for recycling in the Geneva region, with over 50% of our waste recycled, but we can do better. Help us, by making a gesture for your colleagues, for the restaurant personnel and for the planet. Bon appétit!

For more informations, read this article (<https://home.web.cern.ch/cern-people/updates/2018/05/much-less-plastic-thats-fantastic>).

Lluis Miralles Verge  
Head of the SMB department

## X-RAYS SEE ALL

"The tomograph takes a set of X-ray images - up to 4200 for a single scan - and these are reconstructed to obtain the 3-D volume of the object," explains Ahmed Cherif, head of CERN's metrology laboratory. "The volume can then be viewed as a 3-D video showing the different axes and layers, and this allows anomalies to be detected. For small objects, the reconstructed image has a resolution as high as 4 micrometres," adds the head of the non-destructive testing service, Gonzalo Arnau Izquierdo. "The tomograph is capable of producing this level of resolution thanks to its microfocus X-ray tube and its large-surface imager." The imager can also render a wide range of shades of grey, 65 535 to be precise. By comparison, a human eye can only distinguish 256!

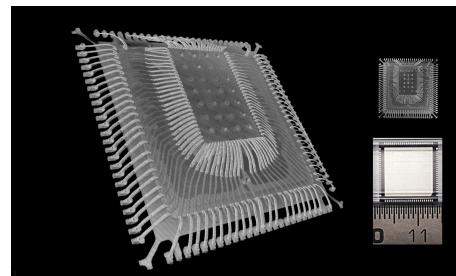
This new and highly versatile microtomograph can also perform conventional metrology with a precision of 10 micrometres. "For example, we can measure components and compare them to a CAD model (Computer Aided Design) in order to show up nonconformities," Ahmed Cherif adds. "It also provides an ultra-precise 3-D representation of an object's surface."

To see this new tomograph in action as well as the other instruments of the metrology laboratory, don't miss the open day organised by the metrology and non-destructive testing teams on 6 June from 9.00 a.m. to 3.00 p.m. Coffee and croissants will be served.

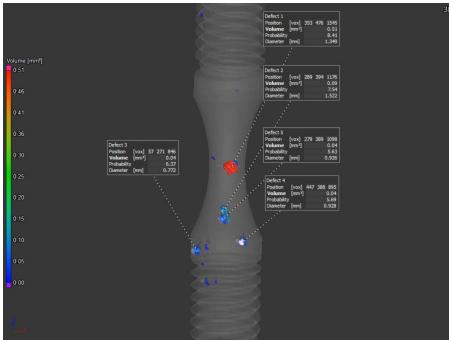
To receive more information on the open day, please write to: [Ahmed.Cherif@cern.ch](mailto:Ahmed.Cherif@cern.ch) or [Gonzalo.Arnau.Izquierdo@cern.ch](mailto>Gonzalo.Arnau.Izquierdo@cern.ch).



Prototype of a power coupler for the crab cavities, produced in titanium using a 3D printer. The X-ray microtomograph is an excellent tool for developing 3-D printed components in CERN's metallic additive manufacturing laboratory. It also performs highly accurate measurements of the dimensions of components - on the inside as well as on the outside - and allows checks to be made to see if porosities have appeared during the manufacturing process.



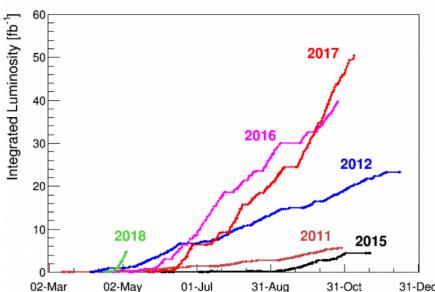
The microtomograph made visible the internal structure of ATLAS's microchips, which are sealed in plastic boxes, revealing nonconformities that may have been caused by short-circuits or faulty connections.



In the framework of the European project ARIES, 15 molybdenum-graphite threaded samples were examined with the microtomograph in order to detect possible internal defects to be correlated with the results of dynamic test checks. It was concluded that none of the samples presented internal cracks at the level of the voxel resolution used – 10 microns. Instead, small amounts of molybdenum-titanium carbide agglomerates were detected in some of them, and studied in more detail. However, the small fraction of agglomerates found does not affect the properties of the material to be employed in the project.

## LHC REPORT: THE LHC IS FULL!

**On 5 May, the last step in the intensity ramp-up process was completed, ten days ahead of schedule. The LHC is now filled with 2556 bunches per beam**



An early and steep increase in the 2018 integrated luminosity curve. For those tempted to extrapolate, there are technical stops, machine development sessions and special physics runs coming up that will form plateaus.

As mentioned in the last LHC Report, the LHC reached 1200 bunches per beam on 28 April and, during the scrubbing run, some activity was observed in the interconnection of 16L2 where, in 2017, the presence of gas condensate resulted in regular beam losses. At that time, it was not known if this activity would be serious enough to limit this year's performance, which would involve a larger number of bunches. During the subsequent steps in the intensity ramp-up (i.e. 1551, 1887, 2175, 2319, 2460 and finally 2556 bunches per beam), the beam losses induced by 16L2 were closely monitored. These beam losses are of two types: firstly, a steady, constant beam loss

that depends on the total number of particles per beam. This beam loss is substantially lower than the threshold that could provoke a beam dump, thanks in particular to a special solenoid that was installed during the second half of 2017. Secondly, erratic beam loss spikes that add to the steady losses, potentially surpassing the dump threshold. The steady beam losses increase when the number of bunches increases but, fortunately, the frequency of the beam loss spikes decreased the longer the beam circulated in the machine. These spikes were "conditioned away", in the parlance used at the CCC for this effect, allowing running with a full machine.

Another very encouraging event took place on Saturday, 5 May, during the last steps of the intensity ramp-up, when the average peak luminosity for ATLAS and CMS was close to  $2.1 \times 10^{34} \text{ cm}^{-2} \text{s}^{-1}$ , equalling or even surpassing the record peak luminosity of 2017. The only caveat here is that the final calibration of the luminosity measurements, provided by the experiments, still needs to be done, using the so-called van der Meer scans that are scheduled to take place during the weekend of 23 to 24 June, which might slightly change the peak luminosity value.

Since the start of the intensity ramp-up, luminosity optimisation by anti-leveelling has been tested and used. To refresh your memory of this technique: during the fills, the instantaneous luminosity and the beam intensity decrease (i.e. luminosity burn-off). This allows, after some time, the crossing angle for the collisions to be reduced, which actually slightly increases the instantaneous luminosity, resulting in a greater accumulation of luminosity in the same amount of time. This was successfully used operationally in 2017. For the 2018 run, an extra step has been added at the end of the fill and after the initial reductions of the crossing angle. This extra step consists of squeezing the beams further down to even smaller sizes. Each fill starts with a beam squeezed down to a beta star ( $b^*$ ) of 30 cm, as used in 2017. Two steps have been added in the optimisation process, consisting of a further reduction, first to 27 cm and finally to 25 cm. Besides optimising luminosity production, this also allows testing of the various types of levelling (crossing angle and  $b^*$  levelling) that are expected to be used routinely during the HL-LHC era.

From now on, the LHC is in production mode for physics. The operation of the machine will be consolidated in parallel,

meaning that the machine settings will be further tweaked, beam life times optimised, performance stabilised and, if possible, increased. On Friday, 11 May, the integrated luminosity for ATLAS and CMS was already at  $6.91 \text{ fb}^{-1}$  (of the  $60 \text{ fb}^{-1}$  planned for 2018).

All in all, a very successful start of, hopefully, a very successful data-taking season for the experiments. A big thanks goes to all the people that made this very efficient start-up possible: a real team effort!



The Integrated Luminosity meters. Left: for ATLAS and CMS, with a target of  $60 \text{ fb}^{-1}$ . Right: for LHCb, with  $2 \text{ fb}^{-1}$  as the target.

Rende Steerenberg

## MUCH LESS PLASTIC? THAT'S FANTASTIC!

### From 28 May 2018, plastic cups will no longer be used in CERN's restaurants

Did you know that, in 2017, 846 000 plastic cups were used in Restaurants 1 and 2? That's two truckloads, or around 2400 cups per day. Can you imagine that?

A widely used and non-recyclable source of waste, a plastic cup takes around 500 years to decompose. Every day, with each and every plastic cup of water, human beings create an additional half a century's worth of waste on our planet. At CERN, efforts have been made to ensure that the majority of waste is sorted and recycled. But we can do better: first, by not using non-essential products, in particular plastic

cups. In this way, we can save the planet 1.5 tonnes of plastic per year!

The Novae team has suggested eliminating plastic cups from all CERN restaurants.

**From 28 May 2018, plastic cups will no longer be used.** Visitors to the restaurants will use only washable glasses, which will significantly reduce the amount of waste every day. The use of personal bottles and reusable thermal cups is another great way to cut down on plastic. If you purchase a Bodum cup from Novae, you will get five coffees free. In addition, if you bring your own cup, you can benefit from a small discount on the cost of your coffee or tea.

However, for this initiative to succeed, we all need to make an effort and use crockery sensibly. At present, three in five people take two glasses on their tray (some even take three!). Given that 2000 people use Restaurants 1 and 2 each day, this amounts to far too many.

In addition, a large amount of cutlery and crockery disappears from the restaurants each year. At least 7850 forks and 4124 knives were stolen in 2017, for example. To help reduce our use of plastic and the amount of waste we produce, **please take just one glass per meal** and leave all cutlery and crockery in the restaurants.

## JOURNALIST VISITING? CONTACT THE PRESS OFFICE

### Around 500 to 1000 people from the media visit CERN every year, and the Press Office organises bespoke visits for them.

Have you ever come across CERN in your favourite newspaper? Have you watched a documentary featuring the LHC? Or have you read a popular science book about particle physics? Newspapers, TV stations, radio channels and blogs worldwide talk about CERN on a daily basis. Most official journalists, photographers, writers and bloggers contact the CERN Press Office when they want to cover stories about CERN, check some facts or find interviewees or other resources such as photos and videos.

Around 500 to 1000 people from the media visit CERN every year, and the Press

Office organises bespoke visits for them. Whenever possible, the press officers find interviewees or guides who speak the same language as the journalist, so that technical concepts are easier to digest even for journalists without a science background. The Press Office also takes care to ensure that access and safety rules are followed and, finally, monitors and archives articles mentioning CERN. During the next long shutdown (LS2) in 2019-2020, we expect a large number of media visits.

However, the Press Office is also aware that some members of the media might contact you directly, maybe because you

have worked together before or they found your name on a publication, webpage or conference programme. In such cases, we invite you to contact the Press Office ([press\(at\)cern.ch](mailto:press(at)cern.ch)) as early as possible for assistance with the visit, ideally one month in advance due to the high number of requests we receive. The Press Office will then help to organise a complete visit that extends beyond your experiment or department, and meets the needs of the reporter. The journalist will also leave CERN having had a richer experience, and maybe will have gathered ideas for new CERN-related stories to write about in the future. Moreover, specific release docu-

ments must be signed to authorise filming within CERN, and to legally protect you from the inappropriate use and distribution of material. Finally, the Press Office can keep in touch with the journalists and send them updated information about CERN.

CERN coverage in the media is only possible thanks to the collaboration of all CERN people who give up their time to guide

media visits and answer journalists' questions. You are encouraged to contact the Press Office if you are running an interesting event at CERN, if your high-profile publication has been accepted, or if you want to challenge yourself by explaining your research to the media. The Press Office also organises media training sessions in collaboration with the HR Department twice a year. There are still some places on the

course in May, so hurry up and register if you are interested, it's not too late!

The Admin e-guide procedure regarding media visits is available at this link: <https://admin-e-guide.web.cern.ch/en/procedure/requests-media-information-or-visits>

*CERN press office*

## COMPUTER SECURITY: RULES: WHAT'S ALLOWED AND WHAT ISN'T

**The CERN Computing Rules govern the usage of CERN's computing facilities, CERN's wired and wireless networks including all devices connected to them**

CERN has always valued its academic freedom, its international character and its openness, welcoming people from all over the world, giving them the opportunity to think outside the box and try something new, fostering creativity and avoiding placing hurdles in their way. It is this open and free environment that allows us to tackle the riddles of nature, to endeavour to understand the universe and its rules, and to advance fundamental research and technology. While such an open academic environment is paramount to the operation of CERN, it cannot be completely free of rules...

Rules are (maybe?) an annoying but necessary part of running an Organization like CERN. Rules are imposed on CERN by the Host States, e.g. for safety or radiation-related matters, and are also an essential ingredient in preserving the Organization's independence. Rules are also enacted by CERN itself in order to enable peaceful and friendly coexistence inside the research community and, like anywhere else in the world, between people. At CERN, the Staff Rules and Regulations, its subsidiary Administrative and Operational Circulars, and the CERN Code of Conduct provide the official and "legal" framework for the proper and efficient functioning of the Organization: employment conditions and working hours; salaries and benefits; working conditions and safety precautions; access rights and control; as well as how to deal with alcohol problems, harassment and fraud.

The CERN Computing Rules, i.e. CERN's Operational Circular No. 5 (OC5), govern

the usage of CERN's computing facilities, CERN's wired and wireless networks including all devices connected to them, any computer centre service and the systems, data and applications running therein, any computing nodes and storage clusters for any kind of data processing, as well as any digital and connected device that is part of the accelerator complex or the experiments. Here too, academic freedom prevails and OC5 tolerates the personal use of CERN's computing facilities as long as this use "is in compliance with [OC5] and not detrimental to official duties, including those of other users; the frequency and duration is limited and there is a negligible use of CERN resources; it does not constitute a political, commercial and/or profit-making activity; it is not inappropriate or offensive; it does not violate applicable laws." As you can see, online as elsewhere at CERN, you are expected to respect the fact that this is a professional environment and to behave accordingly. The mandate of the CERN Computer Security Officer is to protect the operations and the reputation of the Organization against any cyber-threat; this includes verifying that the corresponding rules are being followed.

As outlined in the *Bulletin* article entitled "Transparent Monitoring for your Protection", measures have been implemented to automatically validate the conformity of personal and professional activity with OC5 and its "Rules for personal usage". Usually, this forms part of our logging and monitoring systems for the detection of intrusions, attacks and malicious deeds against CERN's computing facilities from both outside and within CERN,

as described in some depth in our Digital Privacy Statement. But besides our automatic tools, the Computer Security Team follows up any suspicious activity reported to them by CERN staff, users or third parties from outside the Organization (e.g. affiliated universities, security companies, individuals who are part of our computer "security" network, law enforcement agencies and the police). While we seek to maintain open access to the Internet (including for personal usage), we may in some rare cases block access to, for example, websites hosting malicious content (e.g. drive-by infections, CERN-like phishing pages) or other kinds of clearly illegal material. Please note, however, that you are always responsible for your own web browsing; the fact that you are able to access a website does not mean that it is legal or otherwise acceptable under OC5.

So, please refrain from any inappropriate or illegal usage of CERN's computing facilities, CERN computers/PCs/laptops or any network belonging to CERN, and, for example, do not browse or download offensive material (see "Offensive Public Browsing"), do not post commercial messages on CERN webpages, do not mine crypto-currencies as the resources (electricity, CPU cycles, etc.) are needed by CERN for other purposes (see "Computing power for professionals...only!"), and do not share music, videos or software if you do not have the proper authorisation to do so (see "Music, Videos and the Risk for CERN"). Otherwise, you must face the fact that virtual misconduct might be detected, reported and have real conse-

sequences ("Virtual Misconduct – Real Consequences")...

*Do you want to learn more about computer security incidents and issues at CERN? Register to receive our monthly report. For further information, questions or help,*

*check out our website or contact us at Computer.Security@cern.ch.*

*The Computer Security Team*

## Announcements

### SAFETY TRAINING: PLACES AVAILABLE

There are places available in the forthcoming Safety courses:

- Radiation Protection - Controlled Area - Initial in French, on 11 June 2018 from 08:30 to 17:00
- ATEX Habilitation - Level 1 in French, on 12 June 2018 from 08:30 to 17:00

For updates and registrations, please refer to the Safety Training Catalogue and submit a training request on EDH.

*Safety Training, HSE Unit*

### 5 JUNE: DON'T MISS THE GENDER EQUALITY IN EDUCATION WORKSHOP

indico.cern.ch/e/GEinEducation'. The CERN logo is in the bottom left corner."/>

Gender Equality in Education workshop

With scholars and field experts from UNESCO, IOP and the presentation of the *ABC of Gender Equality in Education* report by OECD.

When: 5 June 2018, starting at 1pm  
Where: Council Chamber, CERN

Find out more and register on [indico.cern.ch/e/GEinEducation](https://indico.cern.ch/e/GEinEducation)

The CERN Diversity Office is rolling out a module on Gender Inclusive Teaching in the National Teacher Programmes. In this framework, it is holding a workshop with academics and field experts.

**5 June 2018, starting at 1.00 pm  
Council Chamber, CERN**

Participants will be introduced to the global landscape of gender equality in education, with the presentation of the *ABC of Gender Equality in Education*, a report by the Organisation for Economic Co-operation and Development (OECD).

Activities in the field of physics education and research on gender equality in science teaching will be presented by practitioners from the Institute of Physics (UK) and a researcher from the University of Geneva.

During the last part of the workshop, participants will learn more about the CERN Gender Inclusive Teaching module, with the possibility of presenting the module themselves to teachers visiting CERN at a later date.

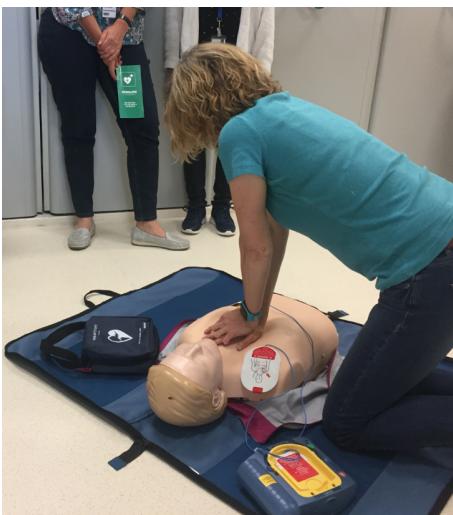
The event is open to everyone working at CERN. There will be a **live webcast**. **Registration details and further information are available at: <https://indico.cern.ch/e/GEinEducation>**

Please share this announcement with colleagues you think might be interested.

Looking forward to meeting you there.

*CERN's Diversity Office*

# FIND OUT HOW TO USE A DEFIBRILLATOR AND SAVE LIVES



Did you know that, as a bystander, you could play a vital role in the survival of cardiac arrest victims? By following a few simple steps, you could dramatically increase their chances of survival.

Over the past few years, CERN's Medical Service has provided "defibrillator and chest compression" initiation sessions, designed to give people the skills and confidence needed to deal with victims of cardiac arrest. They are practical, hands-on sessions, during which you will be shown how to recognise cardiac arrest and how to carry out simple steps otherwise known as the "chain of survival". You will also learn how to carry out chest compressions and how to use a defibrillator. These one-hour sessions are held throughout the year in both English and French and are available to all people working on the CERN site. We can also organise sessions for specific groups of people if needed. Last year alone, 15 sessions were held, with over 150 participants in total.

Were you aware that CERN has 30 defibrillators that are available for use by anyone? Look out for the defibrillator sym-

bol on MapCERN to find out exactly where they are located.

## Anyone can use them

Cardiac arrest can be deadly but with the appropriate bystander help and action, lives can be saved.

## Every minute counts

If you wish to be involved in this "chain of survival", you can register for a Defibrillator and Chest Compressions session via EDH, by clicking here (then click on Safety – Safety and Health – Defibrillator and Chest Compressions).

## Be prepared!

*CERN Medical Service*

## CLOSURE OF THE CERN RESTAURANTS IN MAY

- **Ascension day:** Restaurant 1 will be open from 7 a.m. to 10 p.m. Restaurants 2 and 3 will be closed on Thursday, 10 May and Friday, 11 May. All cafeterias and kiosks will be closed. Normal service will resume on Monday, 14 May.
- **Whit Monday:** Restaurant 1 will be open from 7 a.m. to 10 p.m. Restaurants 2 and 3 will be closed

on Monday, 21 May. All cafeterias and kiosks will be closed.

## MOVING OUT OF ACADEMIA: A NEW SERIES OF WORKSHOP



Many CERN alumni are considering pursuing a career outside of academia leading them to jobs which are just as rewarding and very challenging, however the transition from academia to other career sectors is not an easy ride. Whilst the skills and competencies developed at CERN are highly sought after by employers, translating

those very skills into a language understood by other industries is not always simple.

In our series of events, 'Moving out of Academia to...' we will focus on the different career sectors CERN alumni have moved to, providing an overview of the current job market, practical tips and tricks on how to move to that area as well as a valuable networking session with professionals from the different sectors.

The first in the series of events, 'Moving out of academia to the financial sector', will take place on June 8, 2018 from 14.00 – 18.00. We will have a panel of guests, all CERN alumni former physicists who work in different areas of finance, who will provide valuable information tracing their

journey from academia to finance as well as giving an insight on interview techniques and how to market yourself for a career in finance. The panel discussion will be followed by a networking drink.

This event is organised by the CERN Alumni Relations Office.

### Moving out of academia to the financial sector

June 8, 2018 from 14.00 – 18.00

For organisational reasons, registration is mandatory: <https://indico.cern.ch/event/723196/>

The event is in English, a Vidyo connection will be arranged

*CERN Alumni Programme*

# Ombud's corner

## FAIR'S FAIR – NOW WHAT?

It's the beginning of May and all CERN staff members have now received the results of their performance appraisals.

Martina<sup>1</sup> comes to see me, rather put out: "My boss has landed me with a 'fair'. I've had it now!" Martina's especially disappointed because she thought she'd done a good job over the year. Of course, she knows some of her colleagues do more than her, but isn't that a personal choice?

Perhaps you're one of those who've received a "fair"? It's not the end of the world; quite the opposite: you'll have had the chance to talk about your performance during your appraisal interview. A supervisor who awards a "fair" has nothing fundamental or personal against you: overall, you meet expectations. It simply means there may be room for improvement in some areas, as is true for many of us.

Don't forget that your performance is assessed in comparison with that of the whole team. Take, for example, Formula

1: the drivers are among the best in the world. Nevertheless, at the end of the season, some of them have inevitably done less well than others. That doesn't make them bad drivers, though: they'll work with their teams to find a way of improving their standing next year, which will benefit both them and their teams. They'll dissect their performance, analyse each individual race, identify their weak areas and work out how to improve on them. This is done with the team leader, but the drivers also need the support of the rest of the team: technicians, engineers and co-drivers. It's a real team effort.

Have you had the opportunity to do the same thing at CERN? Your supervisor should have told you what he or she expects of you and worked with you to draw up an objective assessment: what's worked well, what you should keep doing and what, if anything, needs to be changed and how.

Indeed, during Martina's interview, her supervisor told her what she expected of

her: "*Martina, you're an excellent computer scientist, but you ought to keep better records of your programs: it's important for software maintenance and future development, which won't necessarily be done by you. Talk to Mark<sup>1</sup> and Kate<sup>1</sup> about it. They've had experience; they can help you.*" So Martina, armed with this valuable advice, knows what she needs to do!

*If you'd like to comment on any of my articles or suggest a topic that I could write about, please don't hesitate to e-mail me at Ombuds@cern.ch .*

*Pierre Gildemyn*

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<sup>1</sup> Names have been changed

<sup>2</sup> "Fair: Performance generally meets expectations, but may need improvement in some areas in terms of results, quality and quantity of work, or behaviour."