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Special supplement

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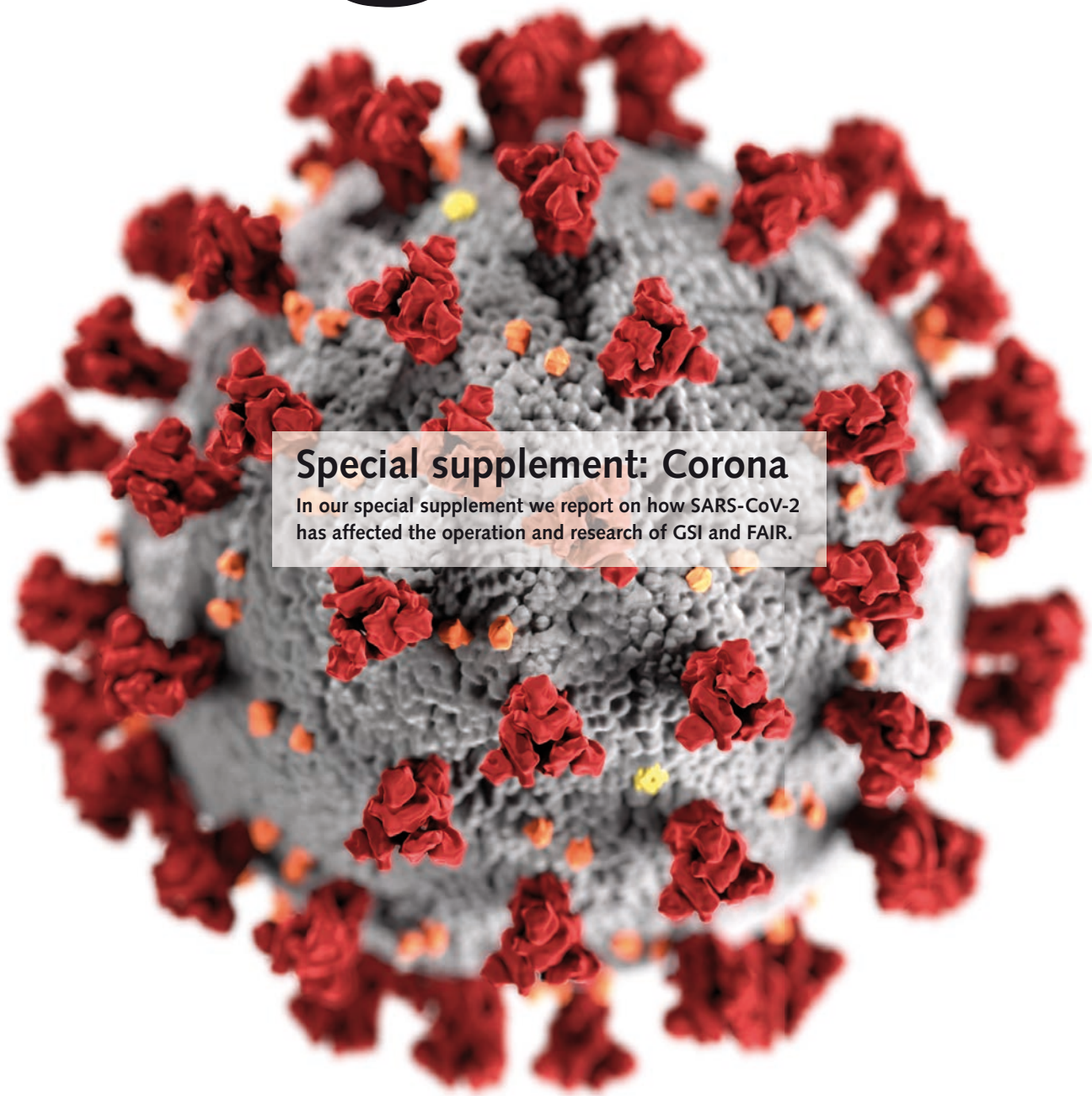


Special supplement: Corona

In our special supplement we report on how SARS-CoV-2 has affected the operation and research of GSI and FAIR.

Beam time

Experiment operation could be continued with restrictions during corona pandemic (page 2).

Projects

How GSI and FAIR can support the fight against corona with their research (page 11).

Interviews

Members of staff report on how they experience the pandemic and how their work routine has changed.

Research during corona crisis —

Accelerator operation and varied experiment program of FAIR Phase 0

Very successful experiments, high-quality ion beams for research — the current experiment time on the GSI and FAIR campus delivers positive results even during the corona pandemic. In numerous areas, the existing accelerator facility has been able to provide researchers with a wide variety of ion beams and open the way for new discoveries and excellent research opportunities in the future. Scientific operations at the modernised accelerators are part of the GSI/FAIR experimental program, the so-called „FAIR Phase 0", which already offers outstanding experimental opportunities while FAIR is still under construction.

Although the experiment program had to be restricted from March 2020 onwards due to the corona pandemic, it was able to continue in part, subject to strict compliance with the official requirements. From this point on, the scientists from all over the world, who usually come to the campus for the experiments, were no longer able to travel. However, they remotely support the research program and the GSI/FAIR staff on site with advice and assistance via virtual means from a distance wherever possible. In addition to the GSI facilities UNILAC (linear accelerator), SIS18 (ring accelerator), FRS (fragment separator) and ESR (experimental storage ring) as well as the existing experiment setups and the Petawatt high-energy laser PHELIX, FAIR components and detectors, measuring apparatus and other high-tech developments specially manufactured for FAIR could already be used. Additionally, the commissioning of the first FAIR storage ring CRYRING has progressed to the point, where it is now ready for scientific experiments. Thus, the current FAIR Phase 0 science program already represents a major step towards future research at FAIR.

In this special supplement to our target magazine No. 18, members of staff report on how they are experiencing and overcoming the crisis. Also, we give you an overview of our research projects to combat the coronavirus. ■

Before the beam time, the facilities were carefully prepared for operation — here in the picture the GSI ring accelerator SIS18.

Dr. Daniel Severin is the so-called beamtime coordinator at GSI. He coordinates the accepted experiments and is the interface between the scientists and the operating personnel of the accelerators. During the preparation phase, he arranges a detailed beamtime schedule, taking into account all technical and experimental boundary conditions as far as possible and to maximize number of experiments to be performed in the available time of accelerator operation. During operation, he organizes the daily "noon meeting" and arrangements between experiments and operation, while always allowing short-term adjustments.

How has your working day at GSI/FAIR changed due to the corona crisis?

Normally my daily routine consists of many meters on foot, because I have to walk a lot between our main control room (HKR) and the experimental stations and participants. Currently, I only work from home, all arrangements are made by telephone or video conferencing, including the daily noon meeting and my daily report to the management. That was a very fast adaption process.

Most of the scheduled experiments are driven by international research collaborations including many external scientists from other countries who were supposed to come to GSI/FAIR. Due to travel restrictions, this is no longer possible, so that some of the planned experiments had to be cancelled. However, we have decided to continue with those experiments that are still feasible and only require our local staff. In some cases, external researchers participate in running experiments via remote access and control e.g. special equipment like data acquisition systems. In other cases, they evaluate the data directly and provide feedback on how the ongoing experiment has to be adjusted.

What protective measures have you taken for the people who are still on site?

We try to minimize the number of personnel on site so that only those persons who are absolutely necessary for operation and experiments are on campus at all. We also strictly observe the distance regulations at our workplaces. In the HKR, for example, the staff always sit at a distance of several meters. The area is completely closed to visitors. Even in the measurement areas of the experiments, a maximum of two persons per room are working if the safety distance can be

kept. Where several hands are needed, for example during installations or repairs, we try to limit it to two people, who then work with protective equipment such as face masks and gloves. In general, we have greatly reduced the number of experiments and can also adapt the beamtime schedule at any time if the staffing situation requires it.

Normally we work in shifts during beamtime. At present, however, groups may not be able to cover individual shifts because people have to stay at home, for example to look after relatives and children. In this case, we interrupt the experiment and, if necessary, prefer to continue the experiment for additional days afterwards. Should the situation require it, we could also switch off completely at any time. I have received feedback from many colleagues that they feel safe and well protected at work. There is great understanding and a very responsible approach to the situation.

What was the biggest challenge that had to be overcome?

The weekend when the restrictions were declared by the state government was not easy. There was a great deal of uncertainty about how things would continue. This concerned not only the private situations of our colleagues, but of course also the continuation of our experimental program. I made many telephone calls, especially with the external experiment groups. We discussed both internally and with the external groups — quite controversially — whether we should continue in the best possible way or stop altogether. Whether it is technically feasible and also responsible to continue. My perception of GSI and FAIR is that we are very well able to adapt to changed circumstances and that we can do so on a broad basis supported by the entire staff. In my opinion we have found a good compromise which is backed up by everybody.

The running experiments are currently providing good results in high quality, so that continuing operation is really worthwhile. It must be remembered that it is not so easy to postpone the operating times, because even the shutdowns, when the accelerator is not running, are always tightly packed with maintenance work, new installations and repairs. So, the more experiments we can handle now, the easier it will be to plan the subsequent experiments, for example next year. But of course, all approved experiments that cannot be carried out at the moment will be rescheduled at a later date after re-evaluation.

What do you wish for the coming period?

The best thing, of course, would be if we had a vaccine against corona tomorrow and everything would relax again. For GSI and FAIR, I hope that we can maintain a mode in which everyone feels safe, so we can continue to do something productive for society. In which we show that with responsible safety handling, it is possible to keep going despite adverse conditions.

We can learn a lot from this situation, for example discovering new possibilities of working together in virtual ways. I am a little proud of how efficiently our groups and department heads work together during this crisis and, with the necessary consideration for needs, make everything possible in a very productive cooperation. But it would still be best if corona were over soon! ■

"For GSI and FAIR, I hope that we can maintain a mode in which everyone feels safe, so we can continue to do something productive for society."

Professor Mei Bai is the head of the GSI business area "Accelerator Operations" which comprises departments entrusted with the development, maintenance and operation of the GSI accelerator facility. Her main tasks are to deliver beam for the experiments of FAIR Phase 0 and to make the existing facilities "fit for FAIR".

Did the corona pandemic change your daily work routine?

At work, actually, not so much. I'm still mainly on campus during work hours and rarely work from home. As we decided to continue operation during the pandemic and the operation personnel for the machine is here, I feel I should be here, too. The captain of the ship can't leave. However, many of my colleagues work from home now at least partly, e.g. rotating presence with a co-worker in the same office to reduce physical contact. I especially miss my team assistants who help me with a lot of work. In my private life it's very different though. My partner is stuck in New York and we can't see each other.

Which protective measures have you taken personally and for your teams?

I'm Asian and we are used to wearing masks. I have done so previously when having allergies or feeling a bit under the weather, this is not new to me. At the beginning there was a shortage of masks and disinfectant throughout the country. So we had to get creative. I want to thank my colleagues, especially Torsten Radon and Karsten Vogt from the "Taks Force Health" and Christian Schmidt from the Detector Laboratory, for providing the operators with masks from their supplies and self-made disinfectant from the chemicals that were available in the lab. We've also received generous gifts from our colleagues in China at the Institute of Modern Physics and the Institute of High Energy Physics, who both sent us a large supply of masks.

Luckily, now the situation has relaxed a bit and the supplies are available again. They aren't mandatory at most of the work stations, but we at least want to be able to offer them to the colleagues who feel safer wearing them. Also, we reduced the parallel operation so that staff at the main control room can work at a safe distance, and of course enforce to keep it and comply with the rules. I also strongly encourage people to take enough rest when needed and not overwork themselves. In a time like this you have to let your body and immune system stay strong and avoid overexertion.

"The captain of the ship can't leave."

What changed in the operation in comparison to the previous plan?

We decided to continue operation, however it had to be reduced significantly. Thankfully the management allowed us to keep running all the experiments that could be reasonably and safely per-

formed. This has its up- and downsides. Many experiments unfortunately had to be cancelled, e. g. due to travel restrictions of external scientists, but it was also a chance for the ones that could be conducted. Some of them got more time than was originally scheduled during which meaningful physics data could be recorded. This is really significant for the PhD student and the team.

How do you organize work in your team now?

Physically I see people a lot less, but the amount of communication remains unchanged. We've just shifted it to e-mails and video conferences. Of course, one can't just quickly go to someone's office and have improvised discussions. But instead we call each other or send a link to join a video conference. All in all, the communication is very good, we've even met for an after-work "happy hour" via video conference.

What was a challenge you had to face?

We really had to make people understand about the safety. A situation like the corona pandemic is unprecedented and nobody knows all the details. It's not my expertise and I can't give judgement on the risks. So we have to be really strict about the guidelines given to us and convince everybody to abide by the rules. Luckily all my colleagues are healthy and so far no-one was affected by the pandemic, and we'd like to keep it that way.

What do you wish for the future?

I really wish this COVID-19 crisis will soon be behind us. Hopefully all will go back to normal as soon as possible, and my partner and I can re-unite again. ■

In the main control room of the accelerator facility: At all operating consoles, strict attention is paid to maintaining a safe distance.

Stephan Reimann is head of the department "Operations" at GSI. He arranges the operating processes of the accelerator facility, organizes shifts and on-call duties and coordinates between the operators, the beamtime coordinator, machine physicists and technical staff. This includes the preparation and coordination of beamtime periods and shutdown phases, the optimization of beam parameters for running experiments and the beam-setup for new experiments. He and his team are also preparing the commissioning of FAIR.

How has the Corona pandemic changed your everyday work?

My work involves a lot of communication, I am constantly in contact with the technical experts, operators, accelerator physicists and the management. Since our colleagues are now required to work from home whenever possible, this communication must now take place by other means. Much is now done in writing, by telephone and via video conferencing. Everyone had to get used to it and there was a lot of room for misunderstanding. It is therefore important to be very clear in what is said and to distribute information about decisions and changes in plans quickly and as widely as possible.

Normally there would be up to 30 people in the main control room (HKR) during the beamtime. Now, only the three operators and a few storage ring experts are allowed. All those present are required to maintain the minimum distances. The operators must sit far enough apart at the consoles and must also otherwise follow all recommended health and safety rules.

In order to maintain accelerator operation, the operators are crucial for us. The control room must also be manned with at least two persons around the clock for safety reasons. Even if only a few operators fall ill or are quarantined, we very quickly get into a situation where we would have to force a shutdown. In order to minimize the risk, we have decided that the operators will no longer attend meetings and will remain exclusively in the control room. The main control room is also closed to all other people. This minimizes the number of contacts and thus the risk. The control room therefore currently offers an unusually lonely sight.

Which work could be maintained, which had to stop?

So far we have been able to reliably maintain accelerator operation. But of course everything takes a little longer. For example, the on-call teams are no longer on campus during the day. They only have to come in from working at home when they are needed. It therefore now takes longer to resolve certain problems.

The experiment program itself had to be reduced due to travel restrictions for many of our users. This also reduces the complexity of the necessary operating modes and thus the general risk of failure. This makes things a bit easier for us.

What measures have you personally taken to continue working while minimizing the health risks?

As many people as possible work from home. I also work from home about 50% of the time. Operators aren't supposed to enter the campus at all outside of shift times.

I have given participants of the on-call duty the opportunity to be on call at home during normal working hours in the current situation. The obligation to be on campus has been suspended. Otherwise, we have provided disinfectant with which keyboards and telephones etc. can be regularly disinfected. Masks and gloves are also available on site. Although wearing them is not yet obligatory, we at least want to give everyone the opportunity to use them, as we want to take into account the different safety needs of the different members of staff.

In addition, on the advice of the experts, we have switched the ventilation

systems in the HKR to outside air operation only so that there is no circulation in the room.

How do you organise work in the team?

All meetings are now held as video conferences, including the daily so-called noon meeting. We then summarise the results by e-mail and sometimes additionally pass them on to the shift personnel by telephone. Overall, there are now many more telephone calls and e-mails.

The large operations coordination meeting is now also held online. The same applies to the shutdown meeting. Here we plan the time and task management for the upcoming maintenance phase starting in June, when the accelerators will not be running.

What challenges did you face?

Especially the initial phase was difficult. We had to adjust very quickly and find the right balance. That wasn't easy, but in the meantime we have adapted to the new situation.

What work can be done from home?

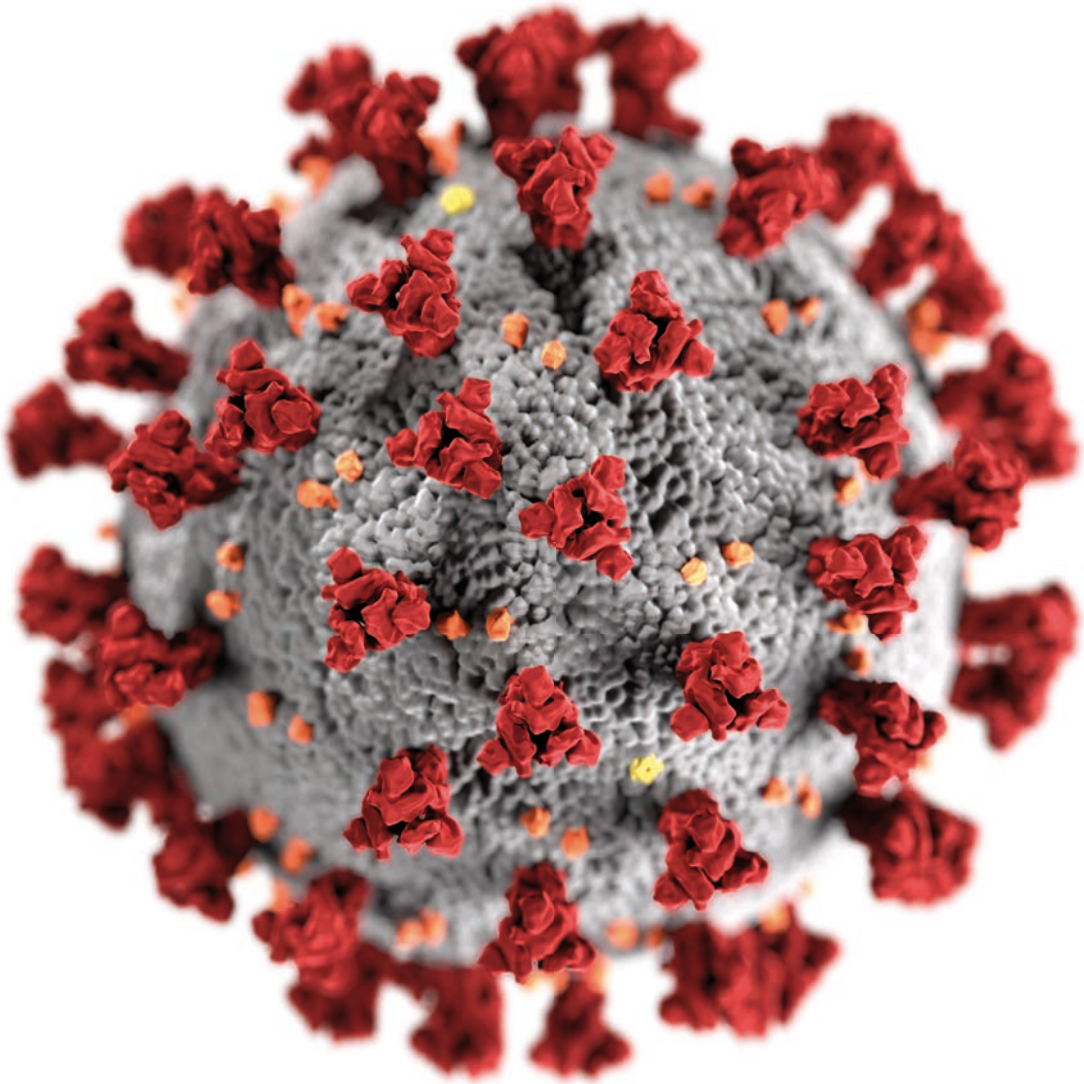
Unfortunately, we cannot operate the particle accelerators from home. Although this would be technically possible in principle, it is not practical. Furthermore, having staff present at the main control room is also mandatory for safety reasons. We can still plan and coordinate well from home. Scientific articles, reports and protocols can be written particularly well at home. However, preparing new projects is difficult, but to a certain extent it is still possible.

What do you wish for the near future?

For the near future I wish above all that everyone remains healthy. Many foreign collaboration partners cannot visit us at the moment. I hope we will see them all healthy again soon.

The interest in beam time at our facilities is very high worldwide. Due to the work for FAIR, however, we currently have only limited time in which we can provide beam time for scientific users. For the operation of the facility, I would therefore like it if we could still complete the reduced program successfully and do not have to go into an earlier shutdown. ■

In the main control room, operation of the accelerator facilities continues. Work can be carried out in the spacious area while observing the distance regulations.



GSI/FAIR research supports

GSI/FAIR uses its research potential and unique infrastructure to contribute to the management of the current corona pandemic. In several areas at GSI/FAIR, scientists are working to provide new insights and technologies that may help to fight the coronavirus SARS-CoV-2. To this aim, the accelerators and laboratories on the Darmstadt campus are also being used. The laboratory is operational, while strictly abiding to safety regulations.

the fight against corona

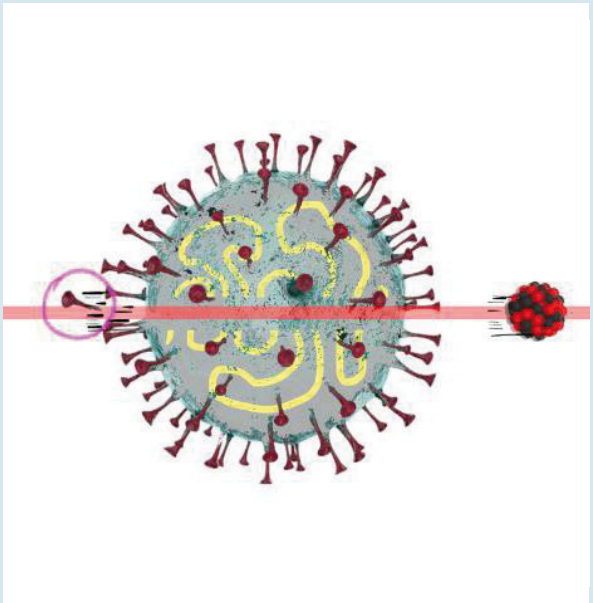
Four projects are currently being developed to exploit the possibilities of GSI and FAIR research in the corona crisis and to expand the fundamental knowledge about the virus. The researchers are working on contributions to the development of vaccines as well as on therapeutic low-dose irradiation options for pneumonia caused by SARS-CoV-2. Other projects aim at the development of faster and optimized virus detection and at the possibility of producing improved viral filtration masks.

As always, GSI/FAIR actively cooperates with other research centers: one of the measures involves collaboration with the Helmholtz-Zentrum für Infektionsforschung (HZI) in Braunschweig, another is in cooperation with the University Hospitals in Frankfurt and Erlangen. The other two projects are developed in cooperation with universities in the USA and Argentina as well as the University Hospital Gießen-Marburg and the company TransMIT GmbH in Gießen.

In the following, we will briefly introduce the four projects to you. ■

Ion radiation for vaccine development

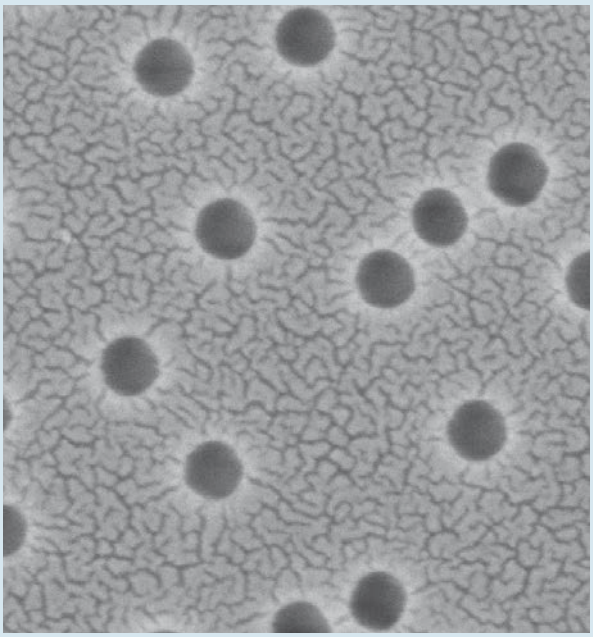
To develop vaccines using inactivated viruses, researchers need methods that inactivate the virus while causing as little damage to its structure as possible — in particular the viral envelope that is the key to the immune response. In past years, the inactivation of viruses for vaccine development has been carried out with conventional gamma radiation. However, the use of high doses of gamma rays inevitably leads to damage of the structural- and membrane-associated proteins of the virus that should be recognized by the immune system following vaccination to promote efficient protection. The new project therefore plans to irradiate influenza and SARS-CoV-2 viruses with high-energy heavy ions. Energetic ions are able to inactivate the virus by inducing breaks in the viral RNA with only a few passages in the envelope, thus minimizing membrane damage. The resulting viruses will then be examined at the HZI in Braunschweig for their ability to promote the formation of virus-binding and neutralizing antibodies after vaccination. ■



Viruses could be inactivated by ion irradiation.

Improved and fast virus detection with single nanopore membranes

GSI is working together with international partners on the development of highly sensitive sensors based on nanopores. These sensors have the potential to detect viruses such as SARS-CoV-2 selectively and quickly. For this purpose, a membrane with a single nanopore provides excellent detection conditions. At the GSI accelerator facility, polymer foils are irradiated with individual ions. Chemical etching of a single ion track creates a single nanopore whose geometry and diameter can be adjusted very precisely. In cooperation with external groups, the surface of the nanopores is specifically functionalized in order to monitor the transport of specific particles, molecules or even viruses through the nanopore. Sensors based on nanopores have the potential for high sensitivity and fast detection response. Together with the collaboration partners, opportunities are currently being investigated to support research projects for the detection of viruses such as SARS-CoV-2 or specific filtration processes using the track-etched GSI membranes. ■



Nanopores created by irradiation with ions and chenical etching.

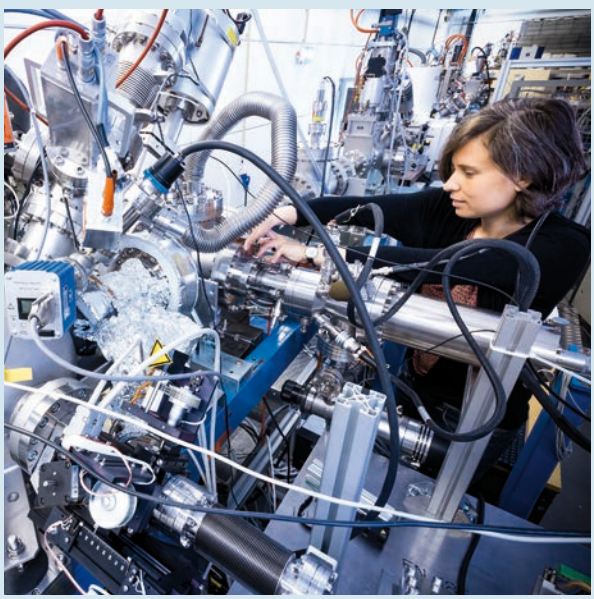
Therapeutic effect of low-dose radiation in SARS-CoV-2 induced pneumonia

In a preclinical study, GSI researchers plan to examine whether pneumonia caused by SARS-CoV-2 can be treated with low-dose radiation. Partners are the University Hospitals in Frankfurt and Erlangen. For this purpose, the anti-inflammatory effects in the lung will be compared under two alternative conditions: One is the use of a typical low-dose X-ray radiation, as it has already been administered in the past for the treatment of pneumonia, the other is the use of an increased radon activity compared to the environmental activity. The scientists hope to gain insights into the stage of the disease at which this might be a suitable approach. It is also important to find a balance between the desired anti-inflammatory effect in the lungs and undesired immunosuppressive, systemic effects of the radiation. In this way, mild exposure to radon could be used as a moderate immunomodulator. ■

Cell research is carried out in the laboratories of GSI Biophysics.

Ion-track membranes with tailored nanopores for viral filtration masks

In this project it is planned to use track-etched nanopores to develop safe respiratory protection filters and thus improve breathing masks. At GSI, corresponding polymer foils with monodisperse and oriented nanopores are produced by ion irradiation and subsequent chemical track-etching. The diameter of the pores can be tailored exactly to size. With an adjustable diameter up to 20 nanometers, such nanopores are significantly smaller than the size of the coronavirus SARS-CoV-2. The radiation process at the GSI accelerator facility also allows the number of nanopores to be precisely adjusted (up to about 10 billion per square centimeter). Together with the collaboration partners, GSI scientists are currently discussing possibilities to investigate the suitability and optimal parameters of track-etched membranes as filters for respiratory masks. Respiratory masks optimized in this way could provide better protection against a virus infection in pandemic situations. ■



In materials research, projects in the field of nanotechnology are implemented.

Professor Yury Litvinov is head of the "SPARC Detectors" group within the GSI research department "Atomic Physics". The group conducts experiments with exotic atomic nuclei in the experimental storage ring ESR. His team is responsible for the construction of novel instrumentation for the future SPARC experiments at the FAIR storage rings. Since 2016, Litvinov is leading scientist for the EU-funded ERC Consolidator Grant "ASTRUm" and since 2017 he is an adjunct professor at the Ruprecht-Karls-University in Heidelberg.

What is your experiment about?

We are presently carrying out a very complex experiment that we have been planning for a long time. It uses our entire accelerator chain, from the ion source, the linear accelerator UNILAC to the ring accelerator SIS18, the fragment separator FRS and the storage ring ESR with its full arsenal of capabilities: beam accumulation, fast stochastic and electron cooling, internal supersonic gas-jet, non-destructive particle detection, etc. We accelerate lead ions and then knock out a proton in a production target to create the isotope 205-thallium. To filter it out of the multitude of other nuclear reaction products in the target, we use the FRS. Then we feed it into the ESR, where it is accumulated and cooled, and we wait for the ultra-slow bound-state beta decay, where one of the neutrons of the thallium is converted into a proton. The resulting electron is captured directly by the daughter nucleus 205-lead, therefore the name bound-state decay. But 205-thallium and 205-lead are so similar in mass that we can't bring them apart while they are both circulating in the ESR. Therefore, after some time we strip the produced electron off the lead ion in the gas jet, then the orbit of the lead in the ring changes sufficiently so that we can distinguish and measure both nuclei. As of today, such exotic decays can only be studied at GSI where we have these unique experimental facilities and instrumentation.

What insights can be gained from the experiment?

The decay processes play a major role in understanding the formation of elements in stars, the so-called nucleosynthesis. Thallium is located at the very end of the slow neutron capture, the so-called s-process. This is one of the processes by which heavy elements are formed in giant stars. It is believed that the s-process is responsible for about one half of all elements we see around us on earth, in our solar system, or in the galaxy. What makes 205-thallium special, is that it is normally stable and only becomes unstable when it has lost its electrons, as can often happen in a star interior. Furthermore, the daughter 205-lead has a very long half-life of 17 million years and decays to our 205-thallium. Whether and when lead decays to thallium and thallium decays back to lead then of course influences the sensitive balance between the final amount of produced thallium and lead. It is therefore an important building block for understanding the abundance of chemical elements in our universe. From the balance we can learn about the origin of the material from which our solar system was formed.

How has the corona pandemic changed your everyday life?

It was an extreme cut that brought us to the limit. A large number of colleagues from Germany and abroad — from Europe, Asia and North America — were supposed to come and contribute to the experiment, but now they can no longer travel. It is the hands of the external experts, for example for special equipment, that we lack on site. But they try to support us as much as they can from a distance via all available communication channels. Personally, I particularly

Keeping the distance — also at the operating console for the storage ring ESR.

miss the exciting and lively atmosphere with many colleagues present in the main control room. Normally we uninterruptedly discuss with people involved, we develop ideas and often controversial solutions to problems and give each other feedback. And of course we also instruct young researchers who look over our shoulders and learn. None of this is possible right now, the people on site have to just make a lot of decisions on their own since an effective brainstorming does not always work via an ad hoc video conference. Because of the reduced staff, many activities take longer. Normally we work three shifts at the experiment, but we have currently reduced this to two shifts and take breaks at night.

But I would like to express my great praise and many thanks to my colleagues. The commitment and willingness is enormous! Everyone is contributing their best to overcome any difficulties that arise. Also I would like to thank our management for a constant support. Our Scientific Managing Director Professor Paolo Giubellino is visiting us every evening in the main control room, which we appreciate very much.

What protective measures have you taken for yourself and those involved?

The rule of distance naturally also applies to us. We try to work with a maximum of two people at the same place, who then also wear protective masks where necessary. Our colleagues at the accelerator laboratory in Lanzhou in China, with whom we have had a longstanding friendship, were very kind to send us many protective masks that we can use. We owe them a great deal of thanks for this.

What was a particularly difficult problem to solve?

We had to fight a little bit to adjust the whole machine so that our experiment could run and now successfully take data. Many of these challenges would certainly have existed without the corona pandemic, but there would have been more people to help mastering them. Without corona, there would have been around 30 people on site at all times, along with the externals, but now we have to manage with less than ten. For me it is also psychologically difficult that the many externals who have contributed so much to the experiment in the preparation phase can't be here right now to see and harvest the fruits of their work.

What do you wish for the near future?

A little sleep. And I've heard rumors there's been some sunshine during these past few days! But jokes aside, the whole team here has really given all they've got over the past few days. First of all, we are happy that our experiment is going well. I hope that we will be able to take good data for our doctoral students to successfully write their theses, and preferably go home with a "summa cum laude". And I very much hope that my mentor and friend Fritz Bosch, who unfortunately passed away some time ago and who was very much missed in the main control room, would also be satisfied with the experiment. ■

Dr. Christian Sturm is project manager of mCBM@SIS18 experiment. In this project, a large part of the technology of the future FAIR detector CBM has been built as a pre-experiment at the current accelerator facility. Prototypes and pre-series modules of all CBM detector systems with their data readout systems are used. With mCBM it is already possible to test the interaction of detector systems, data readout and data transport to the computer farm of the Green IT Cube on a small scale, which will later be used as a large-scale experiment at FAIR.

Which experiment are you currently working on?

Right now we have experiment time, i.e. we are using the small version of the future CBM detector to observe what happens when we shoot heavy particles with the highest energy and intensity at a target (usually gold targets). This pre-experiment is very important because we will set new records with CBM. Later we want to evaluate 10 million collisions per second online to observe extremely rare events.

How has the Corona pandemic changed your working day?

Our working day has been turned upside down. Normally 20 to 30 colleagues work here on site during the experiment. They come from the various universities in the area, but also from India, Russia, Poland and Romania. Now our international collaboration partners are not allowed to enter the country, and the participants from the universities of Münster, Frankfurt and Giessen cannot be present on site either.

But we were lucky and our experts made it possible in a very short time for all participants to be present from home. For example, data recording no longer has to be started on the computer directly on site, but can be initiated and monitored from outside via an encrypted connection. Detector components can also be configured by the specialists from outside. This enables the external specialists to fulfill many of their usual tasks. A PC in our experiment control room is used for communication, hosting a permanent dedicated line between all participants.

"We have been able to carry out our measurements very well."

Life on campus has of course also changed completely. In the canteen there is only take-away food, but you can always get a parking space without any problems. The social contacts are missing, but in my opinion the services and infrastructure of GSI are still provided very smoothly and with excellent quality. We have been and still are excellently supported!

How do you organize the team and the collaboration work?

All meetings are now only conducted virtually via video conference. That works well. We have even held collaboration meetings with a large number of participants. But that is of course more strenuous, especially when you have to think with each other, when it comes to technical details of the experiment or problem solving, human contact is missing. But we can certainly improve a lot through enhanced technology: We are planning to purchase a good communication system for the mCBM control room so that people can speak freely

anywhere in the room and communicate with colleagues outside. It is worth investing a little here, as this will also be a great help in the future.

Which work could be maintained, which had to stop?

So far, we can say that we have been able to carry out our measurements very well. This is mainly due to the fact that there is a small core team of three to four colleagues on site, who are very committed. My colleagues and I are keeping the experiment going here, taking strict safety precautions to minimize the health risk. If there are technical problems with the detector, we can often solve them on site with the help of the specialists joining us virtually. Just building new components is not possible. This is exhausting for us, but it works better than we thought and we will certainly retain much of this procedure in the future.

What measures did you take to continue working and minimize the health risks?

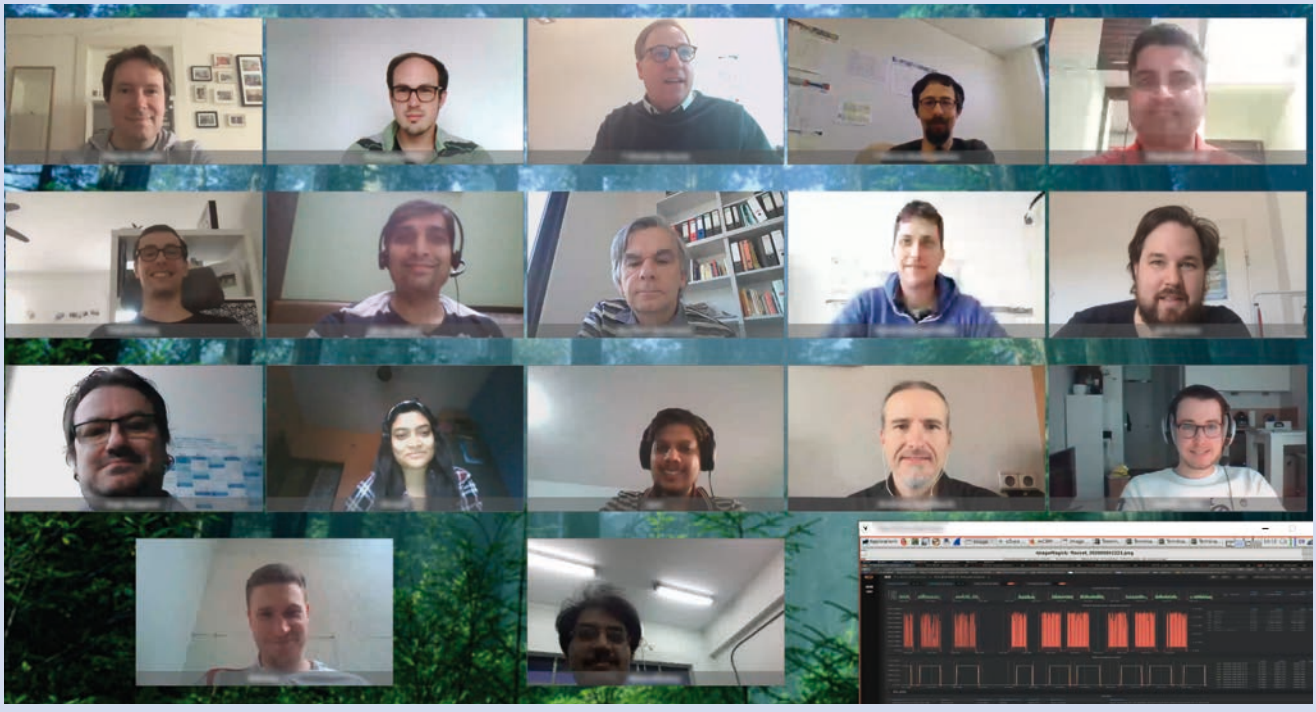
We wear face masks, some of which we made ourselves to protect others from us. We also keep a lot of distance. But the most important thing is that everyone in the small core team is aware of their responsibility and makes sure that they don't take any risks in their private lives. We can rely on that.

What challenges did you face? Was there a situation where you and your team solved a particularly tricky problem because of or in spite of corona?

The biggest challenge was to implement the remote control and the new communication channels in the shortest possible time. Fortunately, our software experts were able to do this very quickly. For our colleagues in India and Russia, the time difference makes working difficult. Some of them are trapped in a lockdown at home, have to work at night and sometimes with poor internet connections. The motivation of all colleagues involved is sensational! We could not do without their specialist knowledge.

What do you wish for the near future?

Of course I wish that this difficult time will be over as soon as possible and I am looking forward to meeting colleagues, family and friends in person again soon. I am looking forward to working together on site again soon and to welcoming guests from all over the world to the campus. Until then, I hope that we can continue our experiments for the next few days (with a little more rest), as we still have an important question close to our hearts. I hope that after that it will be possible to build up new technology, because then we will be working on a big change. I hope that by 2021 at the latest, everyone will be back on campus in good health and we can carry out our next planned experiments. ■



Screenshot from a video conference: International mCBM researchers discuss and support the running experiment at GSI from afar.

Cooperation agreement despite corona crisis

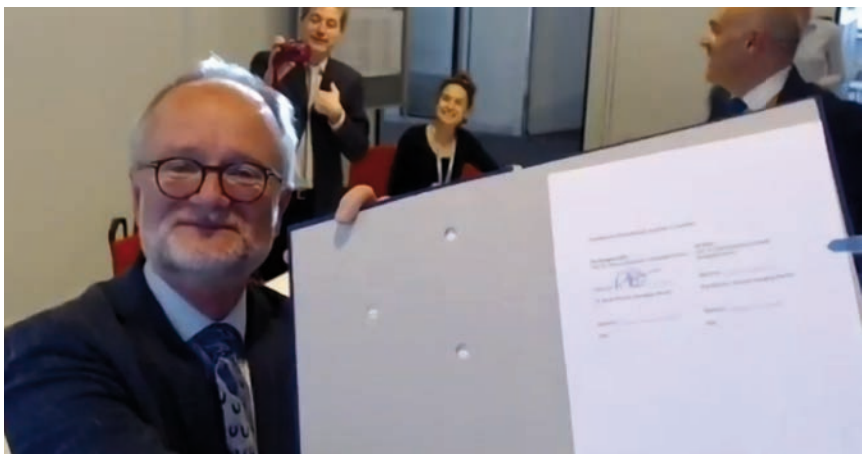
European XFEL and FAIR sign contract in video conference

A cooperation agreement, a so-called „Memorandum of Understanding (MoU)“, was signed by the international free-electron X-ray laser European XFEL and the international accelerator center FAIR in March 2020. Due to the corona crisis, the signing took place in a joint video conference of the involved parties. This was preceded by a virtual seminar talk by Professor Paolo Giubellino, Scientific Director of GSI and FAIR, and Jörg Blaurock, Technical Director of GSI and FAIR, on the status and prospects of the FAIR project. Talk and ceremony were attended by more than 60 video conference participants. European XFEL and FAIR have a lot in common, being both accelerator-based research laboratories serving a broad international community.

Screenshot from the video conference — Professor Paolo Giubellino (r.) and Jörg Blaurock present the signed MoU.

Within the framework of the cooperation, FAIR and European XFEL intend to share and promote their best practices, knowledge and results, for example by organizing joint scientific and technical events such as workshops or seminars. An exchange is planned both in administrative and organizational areas such as the cost structure or dealing with scientific users, and in the scientific environment through joint research and development projects or the secondment of personnel.

In the MoU, both partners acknowledge the importance of cooperation between Big Science projects in administration and technology as a key factor increasing competitiveness. By strengthening cooperation, the MoU aims to exploit synergies in industrial cooperation and to support the achievement of scientific and technological results



From European XFEL Professor Robert Feidenhans‘l signed the cooperation contract.

“With the Memorandum of Understanding, we are opening up new opportunities for fruitful cooperation between European XFEL and FAIR on many different levels. We look forward to joint activities and a lively exchange of ideas among colleagues,” Professor Paolo Giubellino explained. Jörg Blaurock added: “In addition to the administrative and scientific collaboration, at FAIR, the promotion of the technological side through technology transfer and industrial cooperation is a major concern. Here we want to identify synergies with European XFEL and exploit our joint potential.” ■

Dr. Thorsten Kollegger is head of the IT department at GSI and at the same time FAIR-IT coordinator. With his department he operates and develops the IT infrastructure for GSI and FAIR. His teams supervise and operate data centers and extensive IT systems for all areas. Furthermore, they develop advanced software and services for the manifold and unique requirements of GSI and FAIR.

How has the corona pandemic changed your daily work routine?

The corona pandemic has changed the daily work routine in our team very much. Already in January we received the first requests for IT support from external users. Due to travel restrictions that already existed in some countries at that time, they were no longer able to participate in the experiments on site. From this point on, we have been working on implementing remote solutions for the work of the experiment collaborations or in the accelerator area. As of mid-March, when respective measures were also introduced in Germany, the demands on IT for setting up remote work have downright exploded. At the same time, we have completely changed our method of working together from one day to the next, since a large part of the team has moved to working from home.

What new demands does the corona crisis place on your work? Which new tasks have arisen as a result?

Many new questions have been submitted to us. How can you participate remotely in an experiment or the accelerator operation? How can we best maintain communication between people from different institutions around the world or people working from home? How can data protection and IT security be guaranteed when working remotely? How can network connections be configured in a way that ensures functionality for remote access and unhindered data flow? To do this, we had to know the respective requirements of the individual areas exactly and offer individual solutions.

What solutions did you and your team implement?

Many of our systems were not designed for the high demand. We increased the capacity of individual systems by a factor of 50 within one to two weeks. Due to the interruption of the international supply chains, the procurement of hardware and software was a very big challenge which we mastered. Despite all the obstacles, we were able to complete the procurement processes in the shortest possible time.

IMPRINT

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GSI operates a unique large-scale accelerator. Researchers from around the world use this facility for experiments on the building blocks of matter and the evolution of the universe. Currently the accelerator facility FAIR is being built in international cooperation.

FAIR UND GSI IN SOCIAL MEDIA

We developed tailor-made detailed solutions for different groups or special systems. The goal was to enable remote work for groups from the entire campus, from administration to individual projects, experiment groups and the accelerator area. For example, researchers who are abroad can now access their experiments, or experts from the accelerator area can now work from their home.

In addition, we have offered extended support for users. Many people had an increased need for advice because they were working with the new systems for the first time. Our department is well positioned and organized for this. The existing mechanisms and tools for the new tasks were all in place and set up.

However, we had to set clear priorities and reorganize our tasks. For example, large parts of our team responsible for infrastructure only did user support. We temporarily stopped planned project work and the further development of the systems and postponed it to a later date.

How much work did you have to do?

The biggest effort we had with the support. Many users worked remotely for the first time. During the peak phase at the end of March, we received several hundred support requests per day, such as e-mails or calls. That was an increase of about one order of magnitude.

How do you organize work in your team?

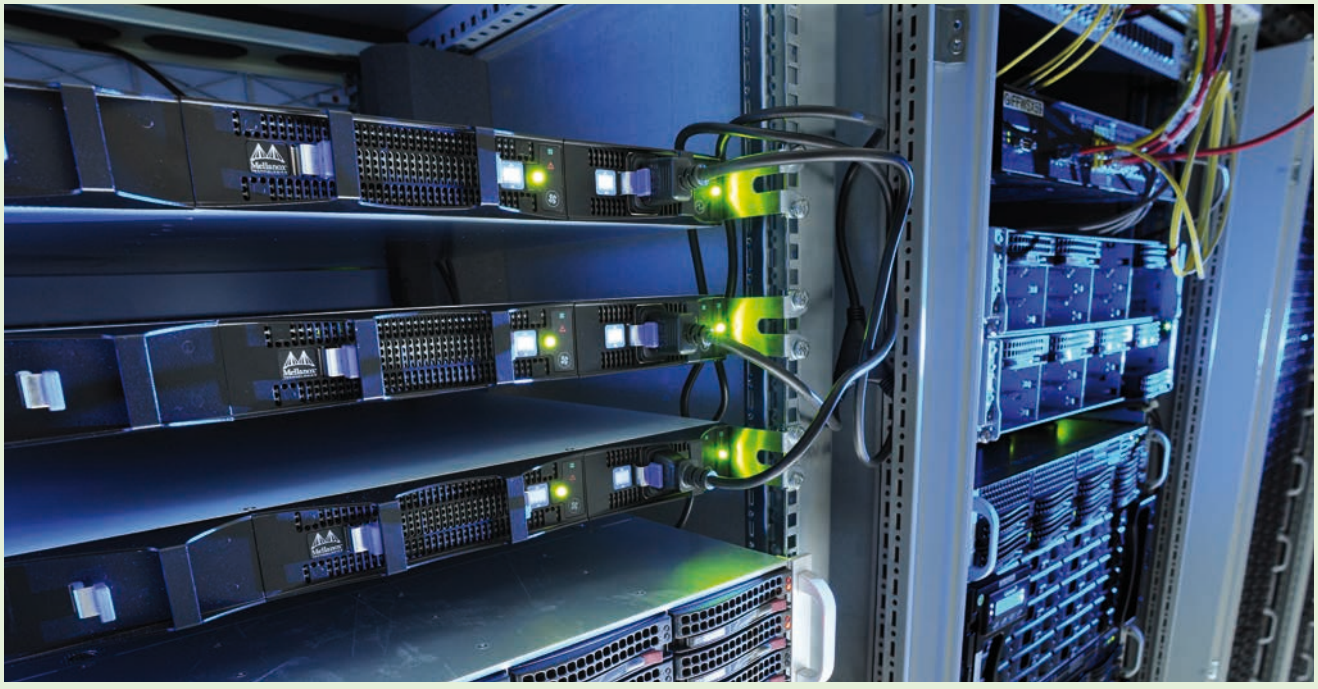
Two-thirds of our people are currently working from home. Only those people who take care of hardware or for whom access to on-site systems is absolutely necessary work on campus. Fortunately, it was easy for the IT department to work from home, as the tools were already available and everyone in the team knew how to use them. Essentially, we communicate now via various video conferencing tools, chat or other virtual communication channels.

Which departments supported you?

Many departments have supported us in the past weeks and have achieved remarkable results. The purchasing department acted quickly in the procurement of hardware and software and, for example, procured many licenses for a completely new video conferencing system within a week. The budget was allocated very quickly by the controlling department. The infrastructure departments of the Plant and Facilitiy Engineering department continue to supply our systems very reliably, even under the current difficult conditions.

What do you wish for the near future?

I hope that this exceptional situation here on campus and also worldwide will be over as quickly as possible and that as few people as possible will suffer from the disease. For my work here, I hope to be able to return to normal operations soon and to actively shape our systems and our work again. ■



The high-performance computing center Green IT Cube at GSI/FAIR provides particularly energy-efficient computing capacities for research.