

MAGAZINE

of Heinrich Heine University Düsseldorf

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A DFG-funded project

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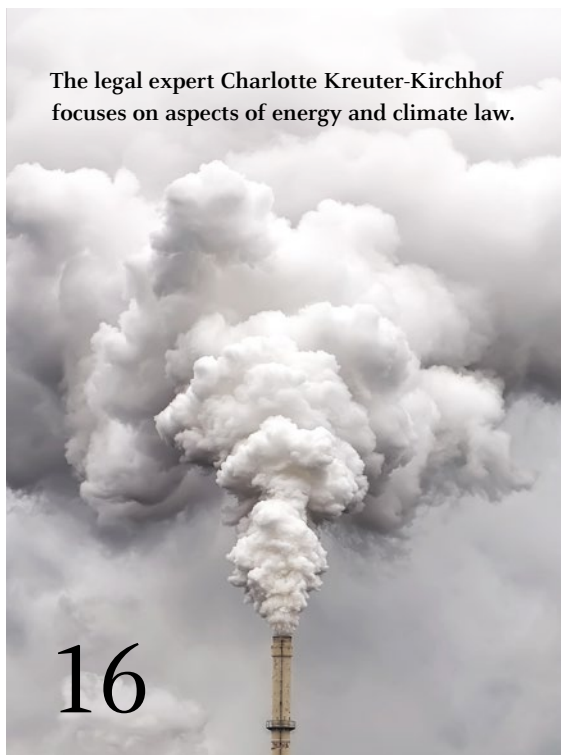


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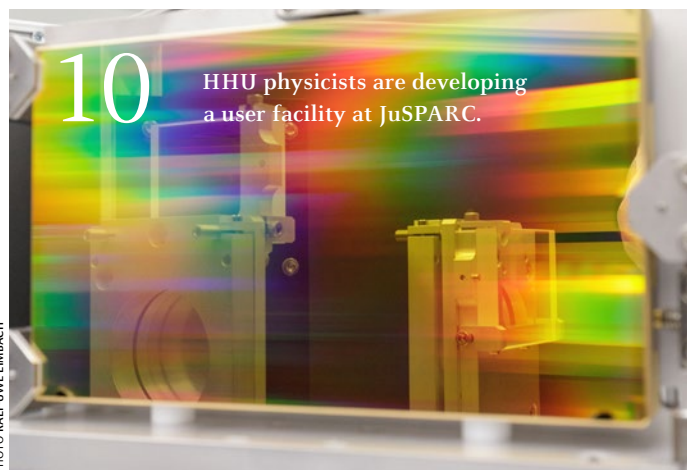


PHOTO RALF-UWE LIMBACH

HHU physicists are developing a user facility at JuSPARC.

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PUBLISHER

Communications Office of HHU Düsseldorf in cooperation with the Office of the Vice-President for International Relations and the International Office, Universitätsstraße 1, 40225 Düsseldorf

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LAYOUT AND TYPESETTING

vista – Digital Brand Content Design
www.studiovista.de

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Editorial



Dear Readers,

Promising research always looks to the future and must be ahead of its time. The plasma wave accelerator featured in this edition of the HHU Magazine is a prime example of this. The large-scale facility is part of a project funded by the German Research Foundation and will be available to users from both HHU as well as Forschungszentrum Jülich.

Precisely these kinds of cooperations constitute yet another factor in the success of excellent research. Indeed, HHU not only cooperates with Forschungszentrum Jülich, but also with countless other external institutions. This is also the case during research projects in the fields of cultural science and humanities, whereby the Parvenue Project at HHU's Faculty of Arts and Humanities is another compelling example of a collaborative project. Taking place in conjunction with one other university and several museums, it is exploring a hitherto little researched phenomenon, namely the social climbers of the eighteenth century known as "parvenus" and their art and material culture.

Other projects are also taking a look back, albeit not quite as far: the study on the long-term costs of government spying is investigating how the Stasi's intensive surveillance of citizens in the former German Democratic Republic is still having an impact today, three decades after Germany's unification. Reflecting on this past helps to explain present-day phenomena and at the same time enables prognoses, for instance on future economic and social developments in eastern Germany.

Questions on the future are also being considered at HHU in other areas, including genome sequencing, climate change and artificial intelligence. We report on the diverse work taking place in these fields in this edition of the HHU Magazine, and once again share intriguing new insights into the breadth and depth of research at our university. I wish you an enjoyable read!

Warm wishes,

Professor Dr. Stefan Marschall
Vice President for International Relations and Science Communication





Art for children

Students from the Institute of Art History are hosting an online multimedia art exhibition on art for children featuring illustrations from the art academies in Düsseldorf and Dresden. Illustrated children's books from the nineteenth century will be showcased until 31 December. Accompanying resources are being made available on the Citizens' University blog.

→ ausstellungen.deutsche-digitale-bibliothek.de/kunst-fuer-kinder



Look who turned out well!

Within the Parvenue project,
Assistant Professor Julia Trinkert
is investigating social climbers

BY VICTORIA MEINSCHÄFER

Porcelain, portraits, Tesla? Every era and every social class has objects that its members (seek to) use to indicate their belonging. The PARVENUE project is exploring the material culture of the eighteenth century as a reflection of social advancement. Which objects made social ascent clear and to what extent were works of art and material culture instruments for creating identity?

When has social advancement successfully been achieved? “When the target society considers the social climber one of their own and they play by the same rules,” responds Assistant Professor Dr. Julia Trinkert, who leads the cooperative project along with two sub-projects and also conducts research herself. While the word “parvenu” today actually mostly has derogatory connotations, in the eighteenth century a rapid social ascent could garner great respect, but also the utmost disdain. Crossing class boundaries required certain social, political and cultural conditions on the one hand and the requisite knowledge of these on the other, which the parvenu then had to use to their advantage.

A complex collection of rules and objects

The objects to own and the rules to follow are manifold. As an art historian, Trinkert is primarily interested in the objects – everything from the appropriate porcelain for fine dining, through clothing and paintings, to town houses and country estates. “It is always important that there is not just one single object that makes clear that social advancement has been achieved. Rather, it is more a complex collection of objects and rules, along with the correct timing for their usage and combination.” In the sub-project exploring the relationship between art and social mobility, Trinkert is focusing on the north German merchant Heinrich Carl Schimmelmann, who succeeded in rising through the ranks from a simple merchant in Stettin to the treasurer for the Danish king. After working as a merchant in Dresden and as a grain supplier for the Prussian army, Schimmelmann attempted to gain a foothold in Hamburg in 1758. The Hanseatic burghers refused to grant him a place among their ranks



ILLUSTRATION AHRENSBURG PALACE

Lorens Lønberg: Heinrich Carl von Schimmelmann (1724–1782). Copy in the style of Stefano Torelli, around 1765

“It is always important that there is not just one single object that makes clear that social advancement has been achieved.”

Assistant Professor Dr. Julia Trinkert — Art Historian



ILLUSTRATION HAMBURG STATE ARCHIVES, 720-1_152-01-07_755

Carl Gottlob Horn: Outside Wandsbek Palace, 1772–1778. Lithograph by David Martin Kanning, around 1850



ILLUSTRATION MUSEUM BURG LINN, INV NO. B 11



ILLUSTRATION MUSEUM BURG LINN, INV NO. B 10

Friedrich and Maria von der Leyen as painted by A. C. Hauck in 1764.

“It is striking among social climbers that they do a great deal to ensure that subsequent generations do not lose their status again.”

Assistant Professor Dr. Julia Trinkert — Art Historian

however. “Schimmelmänn did a lot of things wrong – starting with his extravagant home, an aristocratic palace that he had converted. But that just wasn’t the done thing.” Was the wealthy merchant unaware of this – or did he simply not care? “Precisely that is one of our research questions,” says Trinkert, who also attributes some of his faux pas to the lack of (cultural) education. Schimmelmänn designed his stately home for himself, for example, together with his “house architect”, who was a mere mason and not a qualified architect. It included an entirely unusable gabled section. “Both lacked the specialist expertise, hence they designed a building that was neither technically functional nor aesthetically pleasing.” The same applies to the gardens, which were laid out in 1767 and inspired by the gardens of the French Baroque. “English landscape gardens were actually already en vogue at that time though,” Trinkert explains. Schimmelmänn and Carl Gottlieb Horn were unaware of this, however, as they had referred to the horticultural literature of the seventeenth century – as Schimmelmänn’s library proves.

Long planned or a fortunate coincidence?

One family that approached social advancement with greater sensitivity than Schimmelmänn (and was also considerably more successful) was the von der Leyen family, who were silk manufacturers from Krefeld. The Mennonites actually came to Krefeld as religious refugees, but soon gained a foothold and rose through the ranks to join the city’s leading families. “With social advancement, the family’s lifestyle changed. It then diverged

significantly from the simplicity required of the Mennonite community,” tells Dr Patricia Strohmaier. She is involved in the sub-project on the von der Leyen family, which is looking at the artistic commitment and ambitions for advancement of the silk weaving dynasty in Krefeld in the eighteenth century. Here, too, the question is addressed of whether social advancement was planned long in advance or simply happened by chance. “It is striking among social climbers that they do a great deal to ensure that subsequent generations do not lose their status again,” Trinkert notes. In addition to material possessions, this also always required education and admission to social circles.

“How social advancement worked and why it was sometimes unsuccessful is something we always want to pin down to the material items that the family or individuals owned, as far as we are able to reconstruct this today,” Trinkert explains. Letters and diary entries reveal something of society’s reaction to social climbers, however the reconstruction is also difficult here. The question of how much of an interpretive pattern can be developed to clarify social processes based on the specific use of objects is definitely also fascinating though. And this can then also be transferred to the present day.

→ www.parvenue-projekt.de

About the collaborative project

Heinrich Heine University Düsseldorf, the Academy of Design of the Fresenius University of Applied Sciences in Berlin, the German Textile Museum in Krefeld, Museum Burg Linn and the Hetjens – German Ceramics Museum are involved in the project on the material culture of the eighteenth century as a reflection of social advancement. It is devoted to the hitherto little researched art and material culture of social climbers, so-called parvenus, as instruments of identity formation and self-affirmation. Objects and artworks acquired or commissioned by parvenus in the Lower Rhine region, Hamburg and Copenhagen are explored from art historical and social science perspectives. The project is funded by the Federal Ministry of Education and Research (BMBF).

New centre for ultra- short light pulses

A DFG-funded project

BY ARNE CLAUSSEN

Where large accelerators are currently still needed, physicists at HHU are working to cater to research needs on more compact facilities. With the help of a plasma wave accelerator at Forschungszentrum Jülich, they are now upgrading the versatile JuSPARC facility, which will be available to users for diverse applications.

In three years' time, the Jülich Short-Pulsed Particle and Radiation Center, or JuSPARC for short, will be able to make electromagnetic radiation available over a wavelength range of six orders of magnitude. The frequency spectrum is being significantly expanded and the facility upgraded to a so-called user facility using funding from the German Research Foundation (DFG). "We wish to provide users from a wide range of disciplines with the photon and – where desired – parallel electron radiation they desire around the clock," says project leader Prof. Dr. Markus Büscher from the Institute of Laser and Plasma Physics of the ultimate goal of upgrading the facility.

At its core, the facility consists of the THALES high-power laser already in use with a wavelength in the near infrared and extremely short light pulses in the femtosecond range. One femtosecond corresponds to one quadrillionth of a second. Physicists can use this today to generate electromagnetic radiation from the terahertz (THz) to the extreme ultraviolet (XUV) frequency ranges. A so-called up-conversion module is used for this, which can charge photons energetically one hundredfold.

Charging photons energetically

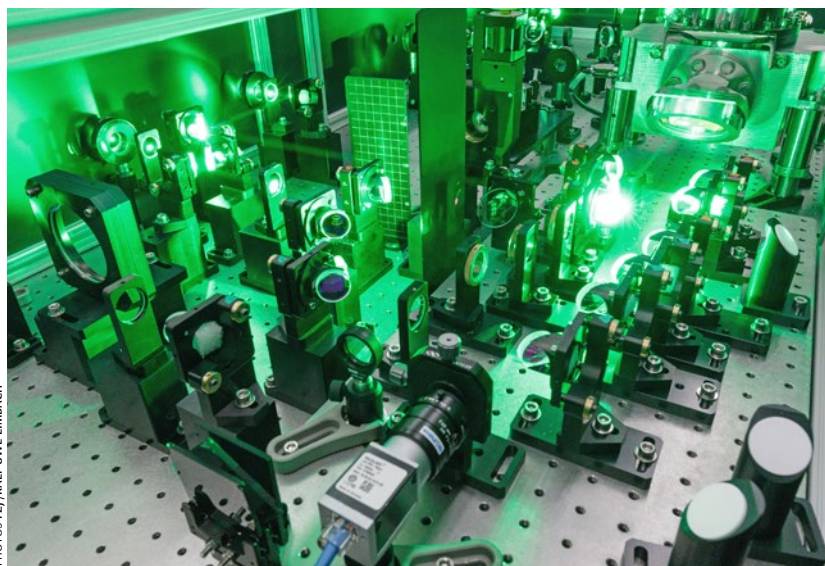
The aim of the new DFG project at HHU is to generate even higher photon energies (into the X-ray range) by means of electron acceleration. The UV photons generated will then be used in a process known as plasma acceleration. This involves using a pulsed, high-energy light beam to vaporise matter and create a plasma. The strong electromagnetic field formed within this greatly accelerates electrons over very short distances of millimetres to centimetres. This has already been successfully

achieved with the ARCTURUS laser at HHU: the facility in Düsseldorf achieves electron energies of 200 MeV. At present, just a few MeV are possible with the somewhat weaker JuSPARC laser.

Broad light spectrum

The high-energy electrons can be used immediately for experiments. However, if they are sent through matter and slowed down there, so-called betatron radiation is produced, which can in turn ionise atoms. If the ions recombine, light is produced – sometimes with very high energies that even extend into the X-ray range.

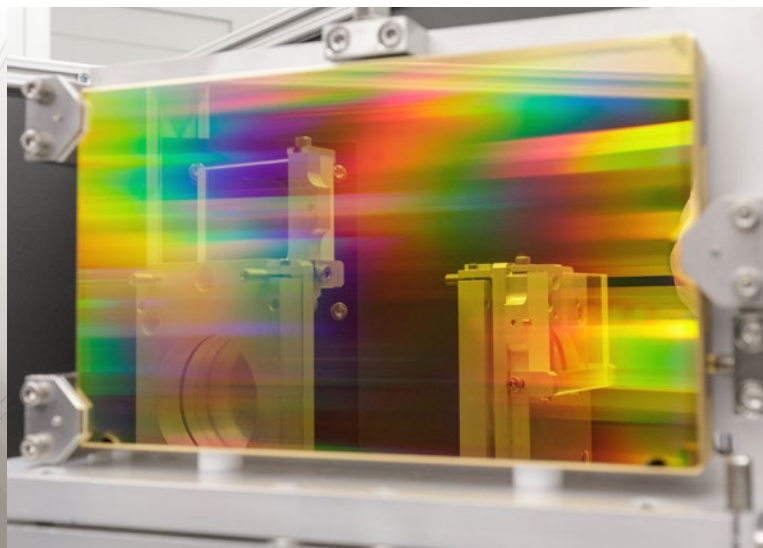
Close-up of the JuSPARC laser setup.



PHOTOS FZJ/RALF-UWE LIMBACH



Prof. Dr. Markus Büscher (left) and his colleagues calibrate the JuSPARC laser.



Optical grating to compress high-intensity laser pulses in time.

But why go to such great lengths to first generate light and transform it into electrons, to then finally generate light again? “These steps allow us to generate light from the terahertz to X-ray ranges, with a very high repetition rate of 1,000 pulses per second,” explains Professor Büscher: “And this all in a laboratory!”

The facility is gradually being upgraded. One important component is what is known as the hydrogen cluster target in which the electrons should produce the desired radiation. The smaller the individual clusters, the narrower the width of the energy spectrum generated. It has already been shown in a doctoral thesis that the pulse duration can also be made extremely short in this way; it corresponds to the transit time of the electron in the cluster particle.

“Our facility is particularly interesting for users who need a very high time resolution at very different wavelengths,” says Büscher. “We achieve this with the extremely

short input light pulses.” It is important for researchers to be able to conduct pulse-probe experiments: the sample is first stimulated with a pulse, for example from the primary laser beam, and this stimulated state is then examined using UV light or the accelerator electrons. One possible field of application is new types of data storage that should work with the help of spintronics. This involves converting a single electron into a bit by using a laser pulse to deliberately “flip” the electron spin. This corresponds to the states of zero and one. JuSPARC can shed light on the processes involved.

Measuring chemical reactions

The kinetics of chemical reactions can also be investigated in this way: a primary photon triggers a reaction and the various reaction steps can then be measured by a second photon that is irradiated at different times.

Markus Büscher is certain: “The new facility being built by HHU will be useful to biology, chemistry, physics and countless engineering sciences. It will be open to users from both HHU and Forschungszentrum Jülich and will help to answer a whole host of questions.”

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“The new facility built by HHU will be useful to biology, chemistry, physics and many engineering sciences.”

Professor Dr. Markus Büscher — Physicist

64 human genomes

New reference for global genetic diversity

Exactly 20 years after the Human Genome Project ended, the international Human Genome Structural Variation Consortium in which HHU is involved has now sequenced the genomes of a total of 64 humans from around the world at high resolution. This reference data set can among others be used to conduct studies on genetic disposition for various population-specific diseases. The aim is to also be able to estimate the individual risk of developing certain diseases such as cancer and to use this as a basis for more targeted therapies and preventive medicine. The effectiveness of medicines can also vary from person to person, depending on their genome.

Enabling an assessment of genetic health risks

Professor Dr. Tobias Marschall, who heads the Institute of Medical Biometry and Bioinformatics, led the study at HHU's Faculty of Medicine. He believes that "future studies exploring associations between genetic variants and disease susceptibility will benefit greatly from this new approach". A total of 65 authors contributed to the paper that was published in the 'Science' academic journal.

"These new genome sequences enable a far more detailed analysis of data from standard sequencing technologies that are routinely applied to millions of genomes by researchers and clinicians around the world," explains senior author Marschall. They include the full spectrum of genetic variants in genome-wide association studies. Such studies examine variations in the entire genetic information (genome) to identify genetic particularities within particular population groups. Up until now, current technologies could only identify structural variants of the human genome to a very limited extent. The team



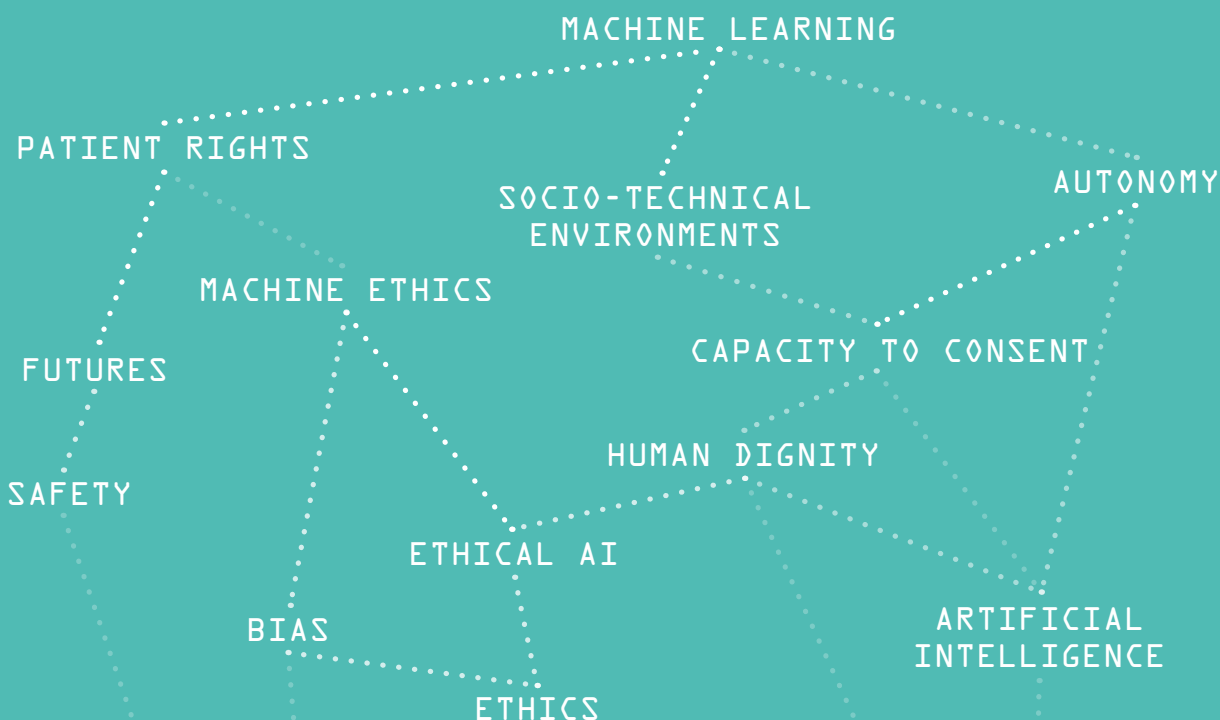
has now published a new, considerably more comprehensive reference data set obtained using the latest technologies. The study was led by researchers from the European Molecular Biology Laboratory Heidelberg (EMBL), the Institute of Medical Biometry and Bioinformatics at HHU, the University of Washington in Seattle/USA, and the Jackson Laboratory for Genomic Medicine in Farmington/USA.

The new method allows the reconstruction of genomes

Every human inherits one set of chromosomes each from their mother and their father. Last year, the researchers already presented a new method in 'Nature Biotechnology' scientific journal to reconstruct these two "versions" of a person's genome without the previous reference genome. The new reference data set now reflects 64 human genomes, which have been assembled using this method. The underlying human cell lineage represents 25 different human populations from around the globe. Due to spontaneous and continuously occurring changes in the genetic material, the distribution of genetic variants can differ considerably between population groups. If such a mutation is passed on over many generations, it can become a genetic variant specific to that particular population group.

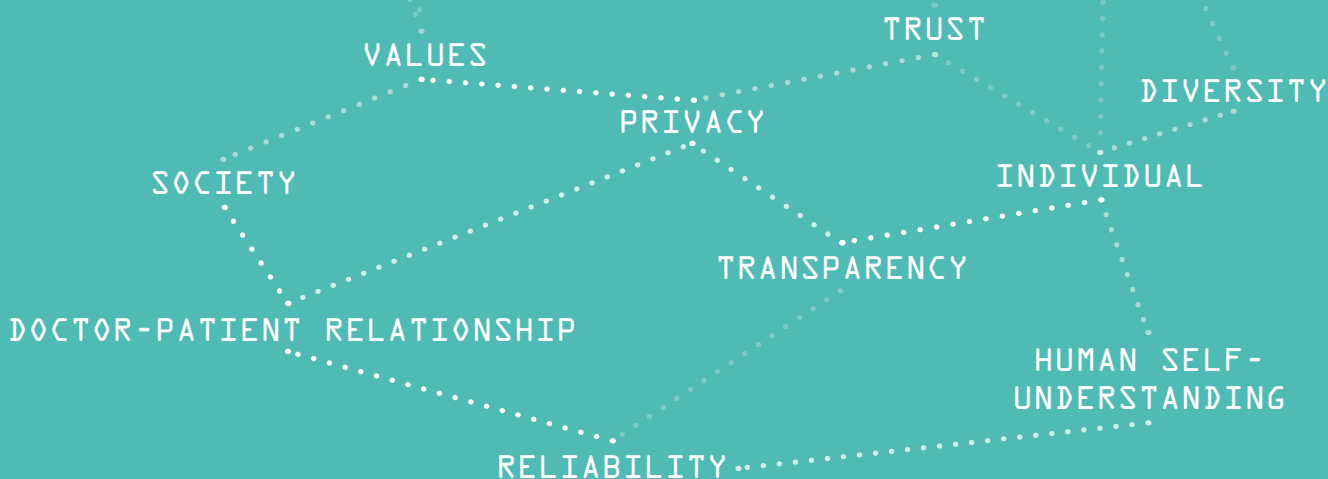
"The new reference data allows genetic differences to be studied with unprecedented accuracy against the background of global genetic variation. This facilitates the biomedical evaluation of the genetic variants carried by an individual," says the study's co-first author, Dr Peter Ebert from the Institute of Medical Biometry and Bioinformatics. A. C. / S. D.

→ Link to the study: <https://science.sciencemag.org/content/372/6537/eabf7117>



A theoretical journey into the future?

Artificial intelligence could assess patients' capacity to consent



BY SUSANNE DOPHEIDE

Can artificial intelligence help to determine the capacity to consent in medical settings? This notion, which is today as unthinkable as self-driving cars on public roads were just a few years ago, is just one aspect being considered within the SMART / AI-AUTONOMY project presented at re:publica 2021 in May: the fundamental capacity of patients to give consent is also the legal requirement for “informed consent”, without which no medical intervention can be performed during a diagnosis or treatment.

It is therefore a central requirement for people to receive any medical care at all. And artificial intelligence should be used here, of all places? A closer look reveals that the project led by OTH Regensburg in which the Düsseldorf-based medical ethicist Prof. Dr. Heiner Fangerau is involved is actually anything but far-fetched. “There are good reasons to consider whether and how artificial intelligence can support, replace or improve current practices in this area of medical intervention reserved entirely for humans,” says Professor Fangerau, Director of the Institute for the History, Theory and Ethics of Medicine. For how reliable are humans really and how safe are the procedures used to date?

An inability to provide consent and a limited decision-making capacity present serious problems. A number of studies have identified high degrees of misjudgement, which are as much as one third – or even significantly higher – among certain patient groups. Elderly patients or patients with mild dementia, for instance. In one study, the agreement rate among doctors assessing people with mild dementia was just 56 percent, meaning that the doctors came to very different conclusions about the patients’ capacity to consent. In 2019, the German Medical Association (Bundesärztekammer) moreover pointed out that errors in the assessment can lead to patients’ rights being violated.

An AI application is to now compensate for these shortcomings, which should not be the sole responsibility of doctors at the bedside. The task is by all means a difficult one. When assessing patients who are ill and therefore already impaired, clinical staff only have a snapshot of the current situation. They have no means of comparing this with the ‘normal state’, do not know the patients in the same way as their relatives and may

therefore find it more difficult to detect deviations from usual behaviour. Anyone who has ever been in such a situation with a stressed, ailing or even demented person can easily relate. This is compounded by the fact that clinical staff lack the time needed to assess patients’ ability to give informed consent, their subjective values and beliefs may influence the assessment, they lack experience in assessing patients’ capabilities, and the tools currently available are inadequate.

The aim of the research project is to create a catalogue of criteria covering aspects of law, ethics, medium and long-term technical consequences and the definition of IT requirements. Speech and face/emotion recognition are needed, for example: does the patient’s response correspond to the medical practitioner’s question? What emotions do the patient’s facial expressions reveal? Political regulation and differentiation are essential, too. What are the experiences with AI-based technologies in the medical field and what are the political requirements and debates? What is the current legal framework for the ethical aspects of artificial intelligence, robotics and related technologies? Which licensing hurdles could become virulent for this field and what concerns do stakeholders such as doctors’ associations and patient organisations as well as the nursing sector have about these?

It became clear during the research project that considering such aspects at an early stage is not merely a theoretical exercise. Rather, the possibilities that already exist today (or will in the near future) were explored to further improve the reliability of decisions about patients’ capacity to consent. After all, nothing less than health and life itself are at stake here.

→ www.ai-and-autonomy.com

The path to climate neutrality

Professor Dr. Charlotte Kreuter-Kirchhof
on climate and energy issues

BY CAROLIN GRAPE

With their ‘Fridays for Future’ climate strike movement, young people around the globe are calling on adults and politicians to implement effective global climate policies once and for all. This includes immediate compliance with and implementation of the binding climate targets agreed by the international community in 2015 in the Paris Agreement: the limitation of global warming to no more than 2 degrees and, if possible, no more than 1.5 degrees Celsius above the pre-industrial levels. By 2050, global greenhouse gas emissions should be close to zero.

In April 2021, the German Federal Constitutional Court called for a future-oriented climate strategy for Germany that at the same time ensures citizens’ freedom. Its landmark ruling on climate change has provided a great deal of new momentum: the court ruled that Germany’s climate legislation approved in 2019 is unconstitutional in parts and incompatible with fundamental rights as it only provides for measures to reduce emissions until 2030. The targets for emissions reductions from 2031 onwards are insufficient. As a consequence, the dangers of climate change are simply postponed until a later date – at the expense of the younger generation. The lawmakers were called upon to stipulate sufficient targets for emission reductions from 2031 by the end of 2022.

Unprecedented ruling by the Federal Constitutional Court

Prof. Dr. Charlotte Kreuter-Kirchhof from the Chair of German and Foreign Public Law, European Law and Public International Law focuses on aspects of energy and climate law. As director of the Düsseldorf Institute for Energy Law (DIER), she notes: “Even the experts had not expected this ruling. The judges see Article 20a of the German Basic Law as a justiciable norm that obliges the state to protect the climate. The state’s duty to protect life and physical integrity anchored in the basic rights also means a duty to protect life and health from the dangers of climate change. The German Basic Law obliges lawmakers to assign opportunities for freedom

proportionately over time: the burden of reducing greenhouse gases cannot be postponed unilaterally until a later point in time. To safeguard future freedom, the transition to greenhouse gas neutrality must be pursued in good time.”

Supply security is fundamental

Having said this, according to the legal expert, the Federal Constitutional Court also made it clear in its case law that in a modern industrial society, both citizens and companies are entirely dependent on a reliable energy supply: “According to the court, supply security is a common asset of fundamental importance to the common good. So it is essentially ‘as important as our daily bread’. Sustainable development requires a reliable, clean and affordable energy supply.”

“The lawmakers must ensure that the energy transition is reliable, affordable and environmentally friendly.”

Professor Dr. Charlotte Kreuter-Kirchhof — Lawyer

“A separate emissions trading scheme known as the National Emissions Trading System was launched for the building and transport sectors at the start of 2021. It aims to incentivise the use of clean technologies.”

Professor Dr. Charlotte Kreuter-Kirchhof — Lawyer

As the three elements of the energy policy triangle, supply security, economic efficiency and climate protection form the cornerstones of national and European energy policy, and sight must be kept of these as goals of equal importance: “Climate protection is also an energy question in key areas. Energy and climate legislation sets the legal framework. The lawmakers must ensure that the energy transition is reliable, affordable and environmentally friendly. This naturally creates areas of tension that must be brought into an appropriate balance,” says Kreuter-Kirchhof.

National emissions trading

In its climate package, Germany committed to reducing its greenhouse gas emissions by 55 percent by 2030 compared to the 1990 base year and to achieving CO₂ neutrality by 2050. It wishes to achieve these goals in part through national emissions trading: “A separate emissions trading scheme known as the National Emis-

sions Trading System was launched for the building and transport sectors at the start of 2021. It aims to incentivise the use of clean technologies such as electric vehicles and modern heating systems and works by requiring companies that bring fuel onto the market or trade in oil and petrol to participate in a trading scheme. The companies must surrender emissions certificates according to the amount of fuel they distribute. The prices are capped in the preliminary phase: initially, a fixed price of €25 must be paid per tonne of CO₂ emitted. This price then increases by €5 every year thereafter. This fixed-price system is to only become a real trading system from 2026,” explains Kreuter-Kirchhof. To ensure that no one is overburdened financially, the climate package provides for a series of benefits and subsidies that aim to ease the strain on citizens’ wallets – these will be financed directly from the revenue generated with the emissions certificates.

Instruments of climate action

The lawmakers responded rapidly to the ruling by the German Federal Constitutional Court and raised their climate targets (including those for 2030), despite the fact that the court did not explicitly require this: a 65 percent reduction in greenhouse gas emissions (instead of 55 percent) and climate neutrality by as early as 2045 (rather than 2050). “This has huge implications for the entire transformation process: all of the instruments established so far must of course be adjusted to these goals,” the energy lawyer reminds.

National action is not enough however. Only internationally coordinated instruments for cross-sectoral emission reduction will be truly effective. “We are experiencing a very dynamic process here, too.” remarks Kreuter-Kirchhof. “Up until now, the EU wanted to achieve a reduction of 40 percent by 2030. Under the German presidency, the EU and its member states have now declared that this target is to be raised to 55 percent.” The European Commission is expected to present a major package of measures for changes to the European energy legislation this summer.

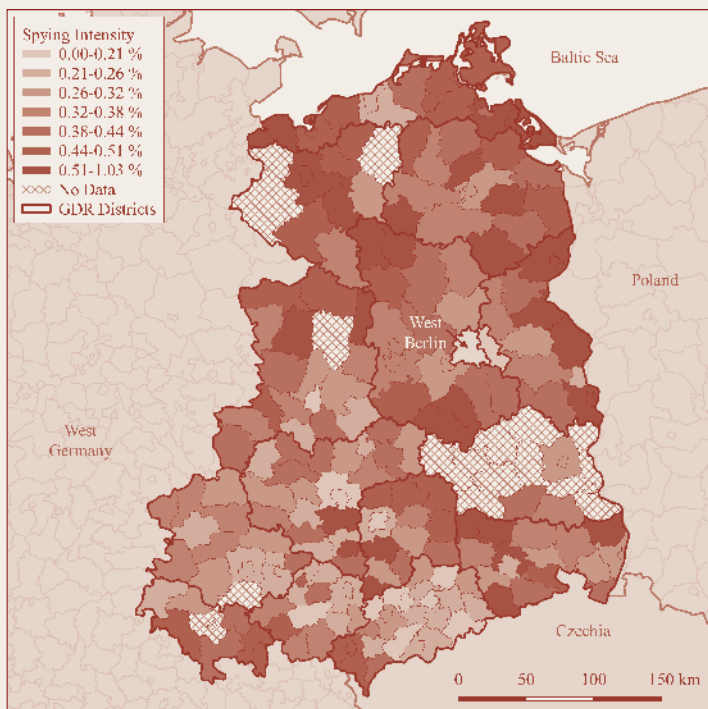
The path to climate neutrality is a marathon and it is important to pace oneself. Germany is contributing important momentum here.



The lasting impact of Stasi surveillance

BY CAROLIN GRAPE

Even now, more than 30 years after Germany's reunification, the consequences of the intense surveillance by the Ministry for State Security (Stasi) continue to shape the lives of many East German citizens. The study on "The Long-Term Costs of Government Surveillance: Insights from Stasi Spying in East Germany" is investigating the far-reaching consequences of the Stasi's surveillance system in a systematic empirical analysis. Andreas Lichter, who is an Assistant Professor of Economics at HHU, co-authored the study.



SOURCE: MPIfR AND CGG (2011) AND @EUROGEOGRAPHICS

Spying intensity in the former German Democratic Republic

“We’re using historical and current data to assess the causal relationship between Stasi surveillance and the economic and social development of East Germany.”

Assistant Professor Dr. Andreas Lichter — Economist

Throughout its existence, the East German regime relied on the systematic and comprehensive surveillance of its citizens to retain power. Recruited by the Stasi, the so-called unofficial employees (Inoffizieller Mitarbeiter, IM) continued their normal jobs, but secretly spied on their neighbours, colleagues and family members and passed all of the information they collected on to the authorities. Historians have long asserted that the consequences of this ubiquitous surveillance apparatus will permanently shape East Germany’s legacy, having caused lasting mistrust in institutions, insecurity in personal relationships and the erosion of social structures. The study on “The Long-Term Costs of Government Surveillance: Insights from Stasi Spying in East Germany” puts these hypotheses to an empirical test and further examines the economic consequences of Stasi surveillance.

The mistrust remains

“We’re using historical and current data to assess the causal relationship between Stasi surveillance and the so-

cial and economic development of East Germany,” explains Andreas Lichter. The German Socio-Economic Panel (SOEP) served as the researchers’ main data source. This annual representative survey of German households and individuals comprises detailed data on respondents’ place of residence, income, employment, education and health.

The economic perspective

Since 1990, citizens of the former GDR have also been included in the SOEP. The authors combined this survey information with data from the archives of the Stasi Records Agency (BStU), which allowed them to precisely measure the number of spies in each East Germany county (Kreis). In the 1980s, around one percent of GDR citizens served as a Stasi spy. However, the spying intensity – so the number of IMs relative to the local population – varied considerably across the country. In some counties, such as Greifswald-Land or Wolgast on the Baltic coast, it was significantly higher than in others.

To identify the causal effect of the Stasi on individuals’ social and economic outcomes, the authors made use of a

notable institutional feature of the East German surveillance system that was at odds with the otherwise highly centralised political system. The Stasi acted according to the principle of decentralised responsibility, whereby a total of 15 district offices (Bezirksverwaltungen) held full responsibility for securing their respective territory. This led to different surveillance strategies across districts and, consequently, varying surveillance intensities at the county level. The authors exploit this institutional setting by systematically comparing citizens in neighbouring counties on different sides of a district border. While the respective two counties were similar in terms of their demographics and economic structure, they differed systemically in their spying intensity because of the Stasi's administrative structure. By pursuing this approach, the authors thus ensured that differences in outcomes (for instance in trust or income) were indeed exclusively due to differences in the spying intensity and no other factor.

“It’s remarkable that effects are not only measurable immediately after reunification, but remain relatively persistent to this day.”

Assistant Professor Dr. Andreas Lichter — Economist

Social and economic disadvantages

Overall, the study shows that the Stasi's surveillance system had substantial lasting effects on the East German population. Citizens of East German counties with a high density of Stasi informants still earn significantly less and are at higher risk of unemployment than citizens from counties with a lower spying intensity. Moreover, those citizens from counties with many spies per capita are less likely to become self-employed. The reasons for these eco-

nomnic effects can in turn be attributed to citizens' loss of trust in state institutions and towards their fellow citizens. “It’s remarkable that effects are not only measurable immediately after reunification, but remain relatively persistent to this day,” Lichter notes.

The study's findings may have implications beyond the case of East Germany. Today, around one third of the global population lives in authoritarian states, where more or less comprehensive surveillance measures are also in place. In light of the study's findings, it appears plausible that the implemented surveillance measures impede people's trust in institutions and their fellow citizens in these regimes to some extent, too. Ultimately, however, the extent to which this is actually true must be examined on a case-by-case basis.

Assistant Professor Dr. Andreas Lichter conducts research at the Düsseldorf Institute for Competition Economics (DICE).



PHOTO IVO MAYR/DICE

 The study was recently published in the Journal of the European Economic Association (JEEA), an extremely prestigious economics journal: Lichter et al. (2021): *The Long-Term Costs of Government Surveillance: Insights from Stasi Spying in East Germany*, Journal of the European Economic Association, Volume 19, Issue 2, April 2021

→ <https://doi.org/10.1093/jeea/jvaa009>



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