HIGHLIGHTS

ERWIN L. HAHN INSTITUTE FOR MAGNETIC RESONANCE IMAGING

2025

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Preface

David Norris

On 4th July 2005 when the Erwin L. Hahn Institute for MRI (ELH) was founded the mood was one of optimism, regarding the collaboration, and some trepidation as to what the 7T system would be capable of. Had we just invested in an expensive toy that would ultimately prove to have little value in practice? Twenty years on we can feel much more confident in the place of 7T MRI in the world, and of course the ELH can look back with some pride on its contributions to that development. But what will the future bring? 7T scanners can now be considered to belong to the palette of clinical systems, but the range of standard scans on them is limited. Away from the clinic, the utility of high spatial resolution imaging for cognitive neuroscience is now undisputed. And everywhere we see the onward march of AI, so it would be a brave (or foolish) man who would predict the future state of 7T MRI!

In the short term, we hope very much to have the application to upgrade our capabilities to Terra.X, with enhanced magnetic field gradient strengths, more channels for parallel transmission, and of course those ubiquitous AI-based tools for image reconstruction. Despite the increasing proliferation of 7T sites worldwide the ELH still has some unique areas of expertise that we hope to exploit, such as examining the brain-gut axis in the context of nutrition and cognition. On similar lines investigating the brain and the spine simultaneously at 7T is an exciting possibility for better understanding the interaction between these two organs. In recent years we have seen an upturn in interest in Phosphorus and Deuterium spectroscopy where the ELH is currently very active in body imaging.

In the long term X-nuclei applications in the brain could also be of interest, particularly for some pathologies such as Parkinson's Disease. Another promising field is the idea of applying non-invasive brain interventions to explore the interactions between different brain regions. Focal intervention with transcranial ultrasound (TUS) offers the possibility to stimulate brain regions with high precision. Although the intervention would initially be performed outside the scanner, the long-term goal would be to have a fully steerable and MR-compatible TUS system for inside the scanner.

In short, the inventiveness of the biomedical MRI community seems to know no bounds. As the tools available become more refined and sophisticated the possibilities seem to exponentiate rather than diminish giving unique opportunities for our institute. From the beginning the ELH has been characterised by its collaborative and 'go-getting' attitude. There is no sign that this is about to change, and so I remain confident that many future years of innovation lie before us.

To highlight the changes and progress made in the past 20 years, all interviewees have kindly included a photo from their early career years.

David Norris

Nijmegen, February 2026

Preface

Mark E. Ladd

The Erwin L. Hahn Institute celebrated its 20th anniversary in 2025. On July 4, 2005, a contract was signed between the Radboud Universiteit Nijmegen and the University Duisburg-Essen to formally establish the institute. The signing ceremony took place in Nijmegen and marked the beginning of an extremely successful cross-border cooperation that is still going strong today. We still had to wait until 2006 for the renovation of the former Control Building of the Coking Plant Zollverein to be completed and the 7T scanner to be delivered, but for the first time we had a legal framework to do our work, including convening of the first Board of Directors, which included David Norris, Edgar Heineken, and myself. It was a very busy time, with hundreds of decisions to be made ranging from the scientific and very technical to picking out the color of the flooring and selecting furniture.

Even though a first 7T system had gone into operation at the University of Minnesota in 1999, there were still very many unknowns to deal with. One of the biggest were the many rumors circulating about the effect such a high magnetic field would have on the people who went into the magnet and maybe even on the personnel operating the system. We were concerned that severe nausea even up to vomiting could be a common occurrence. After I went into the magnet myself as the first volunteer in October 2006, I was much relieved that I did not experience any side effects. Nowadays, 7T has become a widely accepted tool for research studies and is even used for routine clinical examinations at many sites, and we forget about the pioneering spirit that was widespread in those early years.

In the preface of the first Annual Report of the institute that was published in 2008, we highlighted three early projects, which had already identified some of the strengths at 7T that are now the foundation for many of its most successful applications: "*The first report shows the sensational contrast in the hippocampus that can be obtained at 7T, something that will certainly lead to numerous applications. Our second highlighted activity shows stunning images of the brain obtained using the intrinsic contrast of venous deoxyhaemoglobin. The final report documents the progress made in one of our central activities, development of a whole-body coil for human imaging, without which 7T will be restricted solely to neurological applications and the extremities.*" The last reported activity is near and dear to my heart, since a central goal of my personal research has been to enable whole-body imaging a 7T.

Currently, commercial systems are still restricted to imaging the brain and small joints. If we want to leverage the benefits of 7T for the torso, very challenging hurdles must be overcome, and the ELH was already contributing in a major way to achieve this vision right from the beginning. Looking at the current state-of-the-art of body imaging in various research groups around the world, we are on the verge of finally overcoming this last major hurdle and opening up the full potential of 7T MRI.

Here's looking forward to another 20 years driven by our curiosity, enriched by exceptional colleagues, and rewarded with research success!

Mark E. Ladd

Essen, February 2026

“There is nothing that nuclear spins will not do for you, as long as you treat them as human beings.”

Erwin Louis Hahn

A Pioneer of MRI

Whenever we get visitors at the ELH, there always seems to be some confusion about our name. "Who was Erwin L. Hahn?", the visitors will ask. "Why is the institute named after him?"

Despite the groundbreaking research Erwin Louis Hahn (06/09/1921 – 09/20/2016) did during his lifetime, very few people outside the MRI community have ever heard of him. His work laid the foundation for MRI research and revolutionised both science and medical diagnostics. If it were up to us, we would have given him the Nobel Prize.

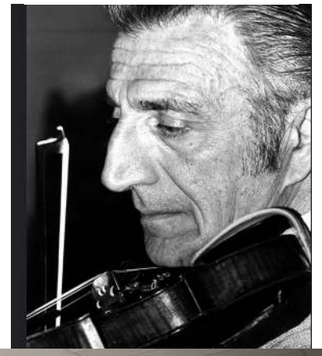
So who was Erwin L. Hahn?

Born in 1921, Erwin L. Hahn was an American physicist and one of the first scientists to establish the relevance of gradient echoes and the discoverer of pulse sequences.

After earning a bachelor's degree in chemistry, Hahn taught radar and sonar engineering in the US Navy during World War II. He was also an assistant to betatron developer Donald William Kerst at the University of Illinois, where he earned a master's degree in 1946. In 1949, he earned a PhD in nuclear magnetic resonance.

In the same year, Erwin L. Hahn discovered the spin echo by chance. He was busy shortening radio frequency pulse sequences when he saw something unusual on his pulse generator. Hahn initially thought it was a fault in the system - an "irritating glitch". But when it occurred again, he realised he was on to something new. At that time, Erwin L. Hahn could not have imagined how important his discovery would be.

Erwin L. Hahn was a passionate violin player



Erwin L. Hahn at the ELH 2009

During his scientific career, Hahn made numerous contributions to magnetic resonance imaging and received several important awards during his lifetime, such as honorary doctorates from the Universities of Stuttgart and Oxford, memberships of the American and Russian Academies of Science and the British Royal Society.

In 2009 he visited the institute named in his honour. He was keenly interested in the research conducted at the ELH and shared lively discussions with the scientists and PhD students on site.

Besides his interest in physics, he had a great passion for music and especially for the physics of music. Hahn played the violin in a chamber music ensemble and taught the physics of music to students. He was considered headstrong and egocentric but also entertaining, charming and sociable. Until his death in 2016, Erwin Hahn always harboured the urge to learn something new; and still published many important publications well into old age.

An interview with Erwin L. Hahn from 2016 can be found here: https://www.ismrm.org/MRM/mrm_highlights_magazine.pdf

ELH - 20 Facts

1. The ELH is currently home to 9 research groups from vastly different scientific fields, making it a truly interdisciplinary endeavor.
2. When the ELH was founded, it's 7 Tesla MRI system was only the 7th installed worldwide.
3. The building used to be the control centre of the coking plant on the now UNESCO Heritage Zollverein.
4. The first ELH annual report was published in 2008 and consisted of 12 pages–back and front cover included.
5. The ELH's founding directors were Mark Ladd, Edgar Heineken and David Norris.
6. The ELH works in close collaboration with renowned partners like the German Cancer Research Center, the Ruhr University Bochum or Siemens.
7. Please remember that regardless of the time and day–the magnet is always on.
8. Funding for 2 ERC grants, 1 ERC advanced grant, and 3 Marie Skłodowska-Curie Innovative Training Networks were acquired from the EU so far.
9. 2 CRCs, 2 FORs, 1 RTG, and 1 Emmy Noether Research Group were acquired from the DFG so far.

10. Time Interleaved Acquisition of Modes (TIAMO) is developed at the ELH, which became a game-changer for the UHF MRI community.
11. In 2023, the ELH launched the art contest "ARTifact", which offers members of the research teams and affiliated institutions the chance to showcase their talents and unique perspective on MRI research.
12. The ELH was the first institute to develop and implement a whole-body coil for 7T MRI–worldwide.
13. The ELH is invested in making science accessible to everyone and regularly participates in events such as "Türen auf mit der Maus" and "Girls' Day".
14. Together with the Center of Medical Biotechnology, the ELH is a member of the UDE's "Biomedical Sciences" Strategic Research Area.
15. The ELH has an "open door" policy and is open for researchers from all around the world willing to do research at UHF MRI.
16. In 2025, the ELH joined both Bluesky and LinkedIn.
17. Wednesday is our event day: Erwin L. Hahn Lecture, Institute Roundtable, Lunch Talk, Workshop, etc. – everything usually happens on Wednesdays.
18. The ELH is co-founder of the "Sex & Gender in the Life Scienes" lecture sessions in cooperation with the Center of Medical Biotechnology and the Essen College of Gender Research.
19. The annual Erwin L. Hahn Lecture & Workshop is a one-day event dedicated to updates in UHF-MRI research.
20. Since 2012, the ELH has presented the Young Scientists Award to outstanding young scientists. The first award went to Oliver Kraff, who is still an integral part of the ELH today.

“Alzheimer's disease starts many years and even decades before there are any symptoms.”

Prof. Dr. Nikolai Axmacher from the Ruhr University Bochum is a neuroscientist whose research focuses on investigating the neural foundations of memory functions and dysfunctions using cognitive neuroscience methods.

His research team is part of the CRC 1280 “Extinction Learning.”

Memory and Navigation

Nikolai Axmacher

Your research focuses on grid cells in the human brain, which are used for spatial orientation, among other things. What fascinates you about this topic?

Grid cells are a fundamental building block of spatial navigation, but not only that: They also seem to be important for our internal representation of knowledge, pointing to a broad role in many cognitive functions like memory, reinforcement learning, and decision making.

Beyond that, they are a prominent cell type in a brain area that is among the earliest to be affected by Alzheimer's disease, suggesting that grid cell dysfunctions may be a marker of early disease stages. On the other hand, their exact cognitive role and pathological relevance is still unclear, and I am trying to understand these further.

Is there anything about Alzheimer's or dementia that is often misrepresented or misunderstood by the general public?

Maybe the fact that Alzheimer's disease starts many years and even decades before there are any symptoms; and on a positive side, that there are recent clinical developments that I believe will provide therapeutic options in early disease stages.

What developments in Alzheimer's/dementia research do you expect or hope to see in the next 5–10 years?

I believe that the early diagnosis by a combination of biomarkers and sophisticated cognitive tests will allow for a personalized assessment of disease risk in preclinical stages (i.e., before any symptoms start). And I also expect that in the next 5-10 years, more pharmacological options with fewer side effects will become available.

What distinguishes the ELH from other research institutions in your opinion?

The ELH combines broad expertise about many areas of ultra-high field imaging– from technical and methodological developments to clinical and cognitive neuroscience. I particularly like the constructive and pragmatic atmosphere that is not suffocating researchers by excessive administrative regulations.

What would you like to learn (more) – professionally or privately?

I would like to better understand the complexities of human emotions and how they interact with cognitive functions.

2004

“Placebo effects are not an obstacle in clinical trials but rather a therapeutic resource.”

Prof. Dr. Ulrike Bingel is an internationally acclaimed expert in pain research. Her work focuses on the interface between pain processing of the central nervous system and cognitive neuroscience.

She is the spokesperson of the DFG-funded CRC/TRR 289 “Treatment Expectation.”

Ulrike Bingel

You are an internationally acclaimed expert in pain research. Where do you see the particular challenges in your field?

Key challenges in pain research concern understanding why some individuals transition from acute to chronic pain while others recover. Chronification is not a uniform process; it reflects a complex interplay of biological, psychological, and contextual factors.

A second major challenge is developing truly personalized treatment strategies. Chronic pain comprises distinct endophenotypes, and moving beyond a ‘one-size-fits-all’ model requires that we define these phenotypes reliably and use them to guide tailored interventions.

Finally, bridging the translational gap remains difficult. To succeed, we must integrate the perspectives of those with lived experience and involve patients throughout research and implementation. Their input is essential for ensuring that personalized approaches are acceptable, practical, and impactful.

What misconceptions about the placebo effect would you like to dispel?

Many people believe that placebo effects are ‘imagined’ or purely psychological. In reality, they are based on measurable neurobiological and physiological mechanisms.

It is often assumed that placebo effects only work in mild or subjective conditions. While it is true that they are particularly powerful for subjective treatment outcomes, placebo mechanisms can also modulate a broad range of symptoms and conditions, including motor symptoms in Parkinson’s disease and aspects of immune functioning.

Third, and probably most importantly, placebo effects are not limited to placebo treatments. Expectation — the key driver of placebo responses — is inherently present in any medical intervention. It can enhance the efficacy and tolerability of drugs and procedures (placebo effects) or worsen symptoms and side effects (nocebo effects).

Placebo effects are not an obstacle in clinical trials but rather a therapeutic resource.

Has there ever been a bold idea or research topic that has never quite left you?

Yes – there are several. But I will share them once they have taken a more concrete shape :-)

Who – living or historical – would you like to discuss your research with over a cup of coffee or tea, and why?

Ha, good question. I am very grateful to have an amazing network of national and international colleagues with whom I regularly discuss our work and share novel ideas— for me, that is truly the best part of doing science. Historically, however, I would actually love to talk to my great-grandfather about my research. I recently discovered that we seem to have shared scientific interests, and I would be fascinated to learn how he thought about these topics in his time.

What role does the ELH play in your scientific work?

The ELH plays an important role in my scientific work. It is a truly unique environment that allows us to push the limits of CNS (central nervous system) imaging further than would be possible elsewhere. For example, we recently conducted our first study on the layer-specific mechanisms underlying pain modulation — an endeavor that simply would not have been feasible without the extra-ordinary methodological expertise available at the ELH.

2004

Prof. Dr. Matthias Brand is a renowned expert in behavioural addiction research. The psychologist is particularly interested in the problematic use of the internet, such as problematic social media use, pornography consumption, online gaming and shopping.

His scientific work contributes to a better understanding of the psychological and neurobiological mechanisms of addictive behaviors and informs public health, policy-making, and clinical practice.

"It is still unclear whether poor self-control is the cause or the consequence of behavioral addictions–or both."

Matthias Brand

Your research focuses on various behavioural addictions. What interests you in this area as a psychologist?

I would like to contribute to a better understanding of why some people develop behavioral addictions and how these addictions are maintained.

In other words, I am interested in the question of why those affected repeatedly engage in certain behaviors, such as playing computer games or shopping excessively, even though they already suffer negative consequences in their everyday lives. At first glance, the answer to this question seems simple: "Because it's fun at the moment." But it's not that simple.

Why do some people lose control over their behavior? Or why is the behavior continued compulsively, even though it is no longer perceived as rewarding and the negative consequences are becoming increasingly severe?

Some people say "addictive behavior is simply due to a lack of self-control". But it is still unclear whether poor self-control is the cause or the consequence of behavioral addictions or both. These are topics that particularly interest me. And finally, of course, the most important question of all is: How can we use the knowledge about fundamental mechanisms to improve prevention and treatment for addictive behaviors?

Is there anything about research work that you're not a fan of?

I'm deeply committed to high-quality, innovative research and try to identify causal mechanisms, knowing that this is incredibly difficult and usually only possible on a preliminary basis. What I find sometimes a bit frustrating is when research is overstated in terms of causality without sufficient evidence. Also, when findings are presented, either in presentations or publications, as definitive and conclusive without solid methods and reflection of the study's limitation, it undermines trust—not just in individual studies, but in science as a whole.

You have a young team that regularly produces successful doctoral theses. What advice would you give to young researchers?

Passion for good research. Choosing a topic that interests them and that they consider meaningful. Curiosity about the undiscovered. Developing enjoyment in working with colleagues. Enjoying and promoting learning and personal development in order to be able to deal with criticism and setbacks. Enjoying controversial discussions. And, above all, celebrating successes together.

2010

What opportunities does the ELH open up for your research?

The ELH is a small but fantastic institute. We have a great collegial atmosphere, which makes a very pleasant and constructive working environment. And then, of course, there is our centerpiece—the (now new, i.e., already second) 7-Tesla scanner. With our 7-Tesla scanner, we can uncover the neural mechanisms involved in psychological processes such as reward processing or reduced self-control.

What have you always wanted to do but haven't managed to do yet? (Professionally or privately)

I would love to be able to play the piano, but my brain can't be persuaded to control my fingers with the necessary delicacy. At most, I could play the triangle or cymbals, however, nobody in my circle wants to listen to that.

Prof. Dr. Dr. h.c. Onur Güntürkün from the Ruhr University Bochum is an internationally acclaimed scientist who focuses on brain research and psychology.

He is a member of the German National Academy of Sciences Leopoldina and spokesperson of the CRC 1280 “Extinction Learning.”

“I especially enjoy interacting with our students. They are very smart, interested, and ready to ask many unexpected questions.”

Biopsychology

Onur Güntürkün

You conduct research in the field of 'biopsychology' – which seems like an oxymoron at first glance. What exactly does this term mean?

I see biopsychology is the contrary of an oxymoron; it is to some extent a pleonasm since “bio” and “psychology” are two sides of the same coin. Humans are the only species that are quintessentially located at the crossroads of biological and cultural evolution. Looking at only one of these two sides will not give us the necessary insights. We need both sides to understand us, with all our thoughts, dreams, emotions, and nightmares. Welcome to biopsychology–in my opinion the most fascinating area of science that I can imagine.

Working as a postdoc in 1989

You conduct research on birds because they are the most evolutionarily distant from humans. Is there anything that has particularly surprised you in your research with these animals?

The paths of birds and mammals parted about 324 million years ago. That’s an incredibly long evolutionary time. On this long and independent voyage, these two lines of vertebrates developed radically different brains. But astonishingly, their cognitive properties are nearly identical; both in terms of what they can cognitively achieve and in terms of their internal cognitive algorithms. Thus, not only their cognitive performances but also the way they think is nearly identical. With one big difference: Birds churn out more cognitive abilities per gram brain than we do. This is the most important surprise of my scientific career. When I realized this, I became aware that this insight can tell us a novel and much deeper understanding of brain structure and cognition. Immediately I was hooked. And still, I am.

You recently received an award as an outstanding professor, among other things for your enthusiasm in teaching. What do you particularly enjoy about teaching?

I especially enjoy interacting with our students. They are very smart, interested, and ready to ask many unexpected questions. This helps me to constantly challenge my own views on the science that I teach. In fact, many research ideas emerged from questions asked by students. In addition, attractive teaching is by far the best advertisement for getting excellent students.

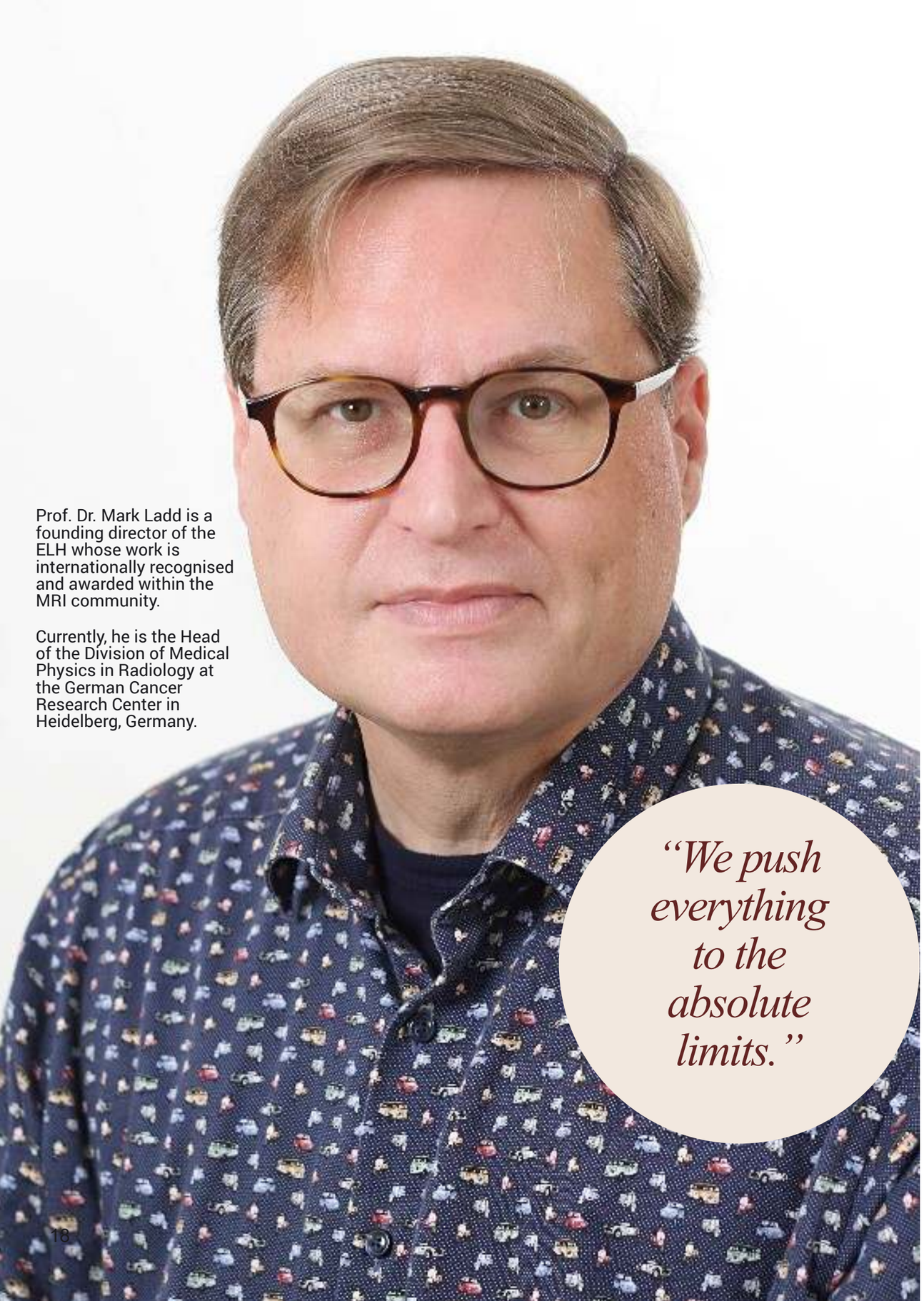
How do you experience the interdisciplinary exchange at the ELH?

Absolutely excellent! The scientists at the ELH cover a large field of (clinical) neuroscience, cognition, and cutting-edge imaging. And they are willing to share their knowledge.

If you could ask your pigeons a question, what would it be?

How do you see the world? What do you think about us humans?

Mark Ladd



Prof. Dr. Mark Ladd is a founding director of the ELH whose work is internationally recognised and awarded within the MRI community.

Currently, he is the Head of the Division of Medical Physics in Radiology at the German Cancer Research Center in Heidelberg, Germany.

"We push everything to the absolute limits."

You are the founding director of the ELH. What motivated you to devote yourself to 7 Tesla research back then?

Actually, I was introduced to the possibility of working at 7 Tesla by Jörg Debatin, the former head of the Radiology Department at the University Hospital Essen where I was working. I believe he generated the idea to pursue 7 Tesla from discussions he had at the International Society for Magnetic Resonance in Medicine (ISMRM). In any case, we started exploring possible sites for the system, which included visits to several very interesting and sometimes historic locations in Essen. After he left Essen for a new position in 2003, I had caught the passion and continued to push for the project, which was fortunately also supported by Jörg's successor Michael Forsting.

Was there a particular highlight for you during your time as ELH director?

Maybe not a highlight in the classical sense, but a particularly strong memory. Before the 7 Tesla system was even installed in 2006, we organized a workshop in 2005 together with Siemens and colleagues from the High Frequency Engineering Department at the University Duisburg-Essen to look at problems we could tackle together. Coming from Radiology, one of the goals that I set early on was to pursue whole-body imaging at 7 Tesla.

The basic ideas of parallel transmit (pTx) had already been presented at conferences and in papers, so I naively thought most of the problems were solved. Today, whole-body imaging at 7 Tesla is finally in sight, but it took over two more decades of hard work in the community to get here.

What fascinates you about UHF MRI?

All of the technology that goes into acquiring good data. Some have compared UHF MRI to the Formula 1 of the MR world – we push everything to the absolute limits, so if it is going to break, it will fail at UHF. That holds for the hardware, but also for pulse sequences and reconstruction algorithms. Many concealed problems with existing bits of technology from lower field strengths have been uncovered when tested in the unforgiving environment of UHF.

How do you motivate yourself on days when nothing seems to work?

That is an advantage I have from age and experience. I have encountered enough disappointments and challenges over my career that my main motivation to push through comes from my knowledge that "it will get better". You just have to put aside the problem for a while and come back to it again.

ISMRM late 1990's

What would you have done professionally if you hadn't gone into research?

Well, I initially started in medical imaging by working with various imaging modalities at General Electric – CT, PET, X-ray, MRI. Through a series of life coincidences, I ended up pursuing my PhD in MRI and went into research. If that had not worked out, I was very happy during my time in industry.

Great colleagues, always something new to learn, and lots of opportunities to redefine your role in the team and move into new areas like service or marketing.

Going back even earlier to my school days, I actually intended to become a veterinarian until the 10th grade. I still wonder how my life would have turned out if I had stayed on that path…

David Norris

One of the founding directors of the ELH, Prof. Dr. David Norris now conducts research at the Donders Center in Nijmegen as well as at the ELH. His prime interest is in the use of magnetic resonance techniques for furthering cognitive neuroscience.

He is also the ain force behind with the Dutch national 14T initiative, which will bring the world's first 14T MRI system to Nijmegen.

"We never believed that a system above 12T would be affordable."

Thanks in part to your efforts, the Netherlands will soon have the first 14 Tesla MRI system in the world. Would you have thought 20 years ago that this would be the case?

No! Back then 7T was the big thing and the moves to 9.4T and 11.7T were considered to be going close to the limit of what would be achievable with MRI. Even at 7T we thought that brain imaging would likely be confined to small regions and that body imaging would be near impossible. It is thanks to the combined efforts of the ultra-high field community including a major contribution from the ELH that we now believe we can master these extremely high fields so that we can obtain high quality data. Another key aspect is that we never believed that a system above 12 T would be affordable. Advances in magnet technology have now made this feasible.

Is there anything you wish you had known earlier in your career?

Probably not the most exciting answer, but not really.

If unlimited resources were available, what would be the next leap forward after a 14 Tesla MRI system?

I'm a bit reluctant to argue for still higher field strengths as at some point we may find that the physiological side effects become too strong, but perhaps 20 Tesla will be achievable. Going above 20 Tesla may result in unwanted physiological effects, and as we would approach 30 Tesla we would also be nearing the critical field for high temperature superconductors. It would be interesting to combine the 14 Tesla with more powerful gradients as this would get close to the ultimate imaging system, especially for the brain.

You have been director at the ELH for many years. What has changed at the ELH over time?

We have lived through many changes, I think Covid and upgrading to the Terra represent the respective low and high points. What has not changed for me is the homely feeling I get when I enter the building, which despite everything is largely unchanged. I can also list a few more key points:

1. We are now on a sound financial basis. In the beginning we were often on the verge of bankruptcy.
2. We have become more open and diverse.
3. The Erwin L. Hahn Lecture is now firmly established as an annual event. In the beginning we struggled to find a successful format for it.
4. We have much more professional support.
5. We are firmly embedded in the structure of the UDE.
6. The pioneer spirit of the early days has however dimmed.

David Norris in New York 1984, attending his first ISMRM

When you come home after a busy day, how do you relax?

I still run about 20 km a week. I am enthusiastically playing Fantasy Premier League with my family, most of whom are football crazy. I enjoy cooking, reading, gardening, and have a large collection of house plants.

“Today, we can do UHF MRI in body regions that have not been targeted before.”

Prof. Dr. Harald H. Quick is the managing director of the ELH. His research focuses on the development of new hardware, RF coils, and methods for UHF MRI, particularly PET-MR.

He is a Senior Fellow of the ISMRM and works in close collaboration with the German Cancer Research Center.

UHF Methodology and Hardware

Harald H. Quick

You are involved in new methods and hardware in UHF MRI research. Which technical achievement of your research group are you particularly proud of?

Working on the world’s first integrated PET/MR hybrid system and helping our industrial partner to get it CE-labeled and ready for clinical use during my first professorship at the University of Erlangen-Nürnberg was a very rewarding experience. And now, back at the ELH, with the development of new hardware, RF coils, and methods for UHF MRI, we increase the clinical application spectrum of the 7T UHF MRI system quite a bit more. Today, we can do UHF MRI in body regions that have not been targeted before. With development of new and improved RF coils we also can support and enable our co-PIs to realize their own research.

One of your main areas of focus is the clinical application of UHF MRI. What do you think the next 10 years will bring in this regard?

When specifically thinking about UHF MRI, I think we will see an integration of multi-channel RF transmit coils behind the wall of the patient tunnel, such that the UHF MRI systems resemble more the clinical 1,5T and 3T systems of today. UHF MRI will provide excellent soft-tissue contrast and high spatial resolution for selected clinical applications where lower field strength see limitations.

How has research changed over the course of your career?

When I started with MRI research during my Diploma Thesis about 30 years ago, everything was a lot more analogue. Talks were prepared and held in double-projection with real slides, not with PowerPoint. Thus, the presentations (and slides, and not to forget VHS or NTSC-PAL video-cassettes!) had to be finished well before the conference. No last-minute adaptions in trains and planes!

Writing a paper required to physically visit the library. Everything from reading to doing research to publishing was a lot slower, but also in a good contemplative way.

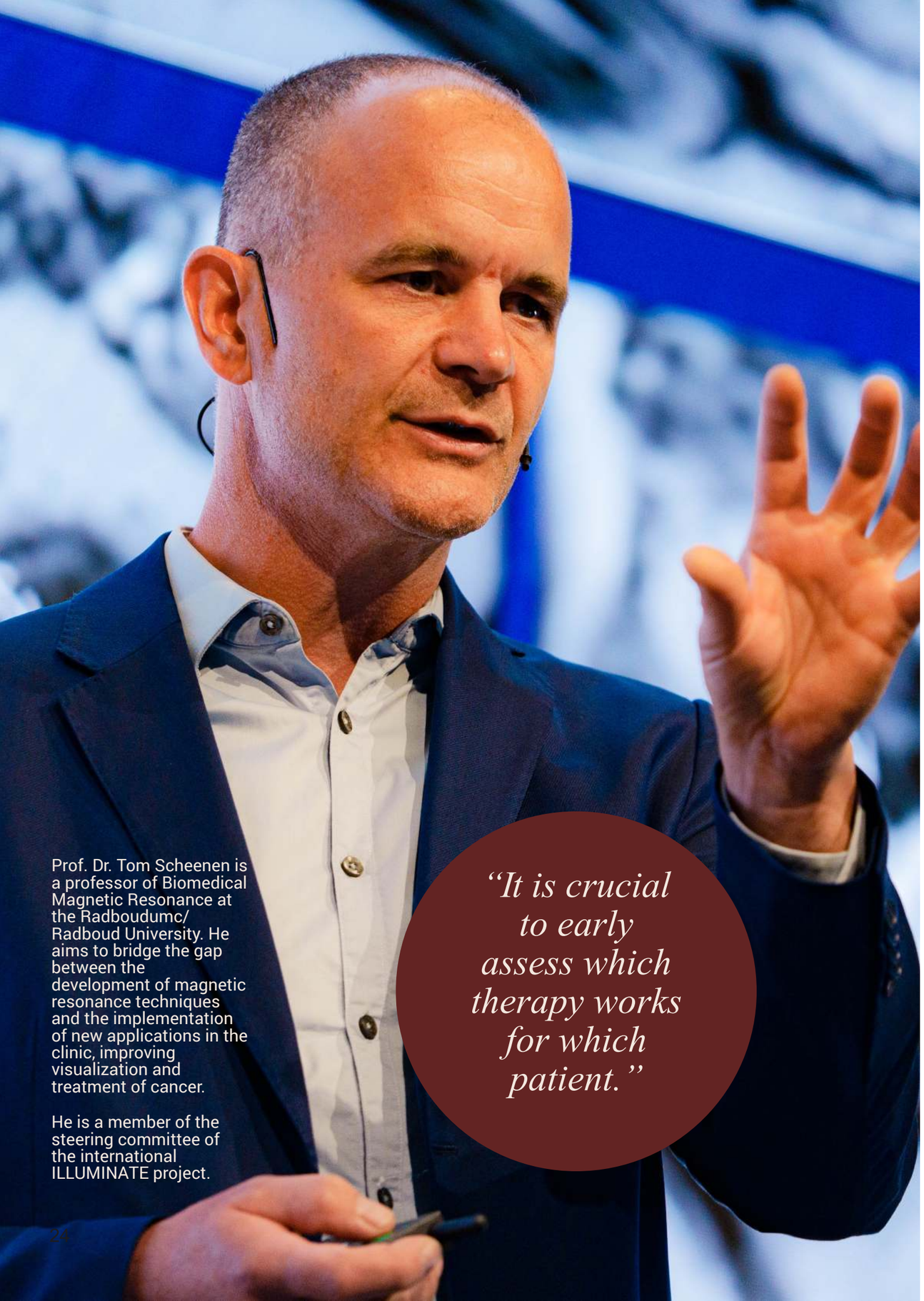
How would you describe the ELH to someone who is unfamiliar with it?

The ELH is a very inspiring and surprising place to do medical imaging research on historic grounds. In the past, no one would have thought that today’s UNESCO World Heritage Site and former Coal Mine Zeche Zollverein would host a 7 Tesla UHF MRI system one day. And even today, most people do not expect 7T MRI research happening in the ELH at this historic site. You have to see it for yourself – Come and visit!

Which other field of research might have interested you as a university student?

Long before studying Biomedical Engineering – from the beginning always with the aim to do MRI research (!) – it was clear to me that some sort of engineering would be the way to pursue. Aerospace Engineering and constructing planes have been long-term favorites. Automotive Engineering would have been another viable option. But then, a bit unexpected, the terms “superconductivity” and “MRI” caught my attention.

2005, posing in a magnet tunnel (1.5T)



Prof. Dr. Tom Scheenen is a professor of Biomedical Magnetic Resonance at the Radboudumc/ Radboud University. He aims to bridge the gap between the development of magnetic resonance techniques and the implementation of new applications in the clinic, improving visualization and treatment of cancer.

He is a member of the steering committee of the international ILLUMINATE project.

“It is crucial to early assess which therapy works for which patient.”

Body Oncology

Tom Scheenen

You are the only PI at ELH working in the field of oncology. What applications do you see for UHF MRI in this field?

The field of oncology is huge, and many different topics are important. We can use the high anatomical resolution and different contrasts attainable at 7T for accurate staging of tumors: does a tumor reside completely within the organ of origin, or is it invading surrounding tissue? Are there any signs of metastases? We have been using a contrast agent to visualize the earliest and smallest metastases of prostate cancer, and have extended this to other tumour types as well. Overcoming the challenges of homogeneous body imaging at UHF will open doors to interrogating other tumor types throughout the human body.

You are currently working with a very exciting project on metabolic magnetic resonance imaging, which could make chemical processes in the body particularly visible. What developments do you hope to see in this area over the next decade?

This touches a passion of mine: exploiting UHF sensitivity for assessing small metabolites in the body with different spectroscopy and spectroscopic imaging methods. With their low concentrations, it is far more difficult to measure metabolism with a somewhat reasonable spatial resolution in the body as compared to ‘merely’ looking at water and lipids. With metabolic imaging we aim to evaluate the response to treatment of cancer at an early time point within the treatment cycle.

This is essential, as for many cancers multiple (expensive) therapies exist, with many more to come, so it is crucial to early assess which therapy works for which patient.

Scheenen at his PhD defense (2001)

What makes a good scientist in your opinion?

Curiosity, the internal motivation to really want to know how something works, or why something is as it is.

Perseverance, it is not easy to be a good scientist.

Open-minded to your team and peers to be able to adapt to new ideas and views, but also (self-)critical: know your literature and push others to be thorough.

Which experiences at the ELH have been particularly formative or inspiring for you?

Making full use of the ELH home-made parallel transmit system in combination with X-nuclei spectroscopy in the early 2010’s: The Essen team enabled possibilities at 7T that up to today have not been rivaled (yet, but we are getting close with the Terra.X upgrade). It created a fantastic playground for the combination of high-resolution anatomical imaging with spectroscopy of nuclei other than protons, enhanced by polarization transfer methods.

Next to that the visit of Erwin L. Hahn was also a beautiful day to remember: devoted at his age, and genuinely interested in new work from PhD students and postdocs set a great example…

Is there a place where you find it particularly easy to think or develop ideas?

I spend quite some time in the car commuting to work, either to Nijmegen or to Essen: that is time to think about the day and new ideas. Next to that, whenever it is my turn to walk the dog in the woods (~4 times a week for 45 minutes) is another good time to contemplate.

Dagmar Timmann

Prof. Dr. Dagmar Timmann is a clinical neuroscientist with a special interest in functions of the human cerebellum. She is also running an ataxia clinic for many years.

She is co-speaker of the CRC 1280 “Extinction Learning” and a member of the CRC/TRR 289 “Treatment Expectation.”

“A question that interests you at one moment may never turn out to be meaningful, or it may only become significant much later.”

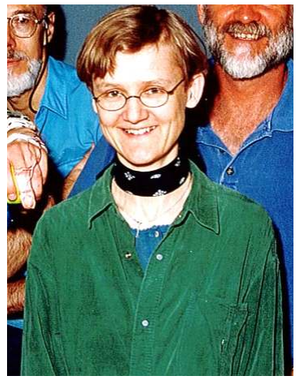
The cerebellum can do much more than people think. Which research finding has surprised you most in your career in this regard?

For a long time, the cerebellum was thought to be involved almost exclusively in motor functions. In the past three decades, however, we have come to understand that its role extends far beyond this.

What has surprised me the most is that I have been involved in this field long enough to see textbooks on the subject being rewritten, with the cerebellar cognitive affective syndrome (CCAS) now recognized alongside the motor syndrome in standard textbook knowledge.

Why did you decide to go into research?

That was a decision that slowly evolved—and one I was fortunate enough to pursue. My first job was a six-month appointment at the Department of Neurology at Essen University Hospital as a physician in internship training. The head of the department, Professor Diener, introduced me to his field of research–the function of the cerebellum. A topic on which I have now been working with unchanged enthusiasm for more than 30 years.



As a postdoc at the University of Western Ontario, Department of Physiology, Canada (1998)

In your opinion, what distinguishes good scientific work?

Aside from the obvious—that research must be driven by facts—I find it difficult to define what makes research “good,” because often you won’t know for a long time. A question that interests you at one moment may never turn out to be meaningful, or it may only become significant much later. Let me therefore rephrase the question and give a personal answer: what is good about doing research?

I really enjoy taking the time to carefully review the literature, connecting my own results with findings from other studies and laboratories, and—what I find most rewarding—suddenly discovering new connections. Even though progress is often small, when a solution suddenly becomes clear, it brings me great satisfaction. This sense of discovery isn’t limited to research; it also occurs when preparing lessons or diagnosing patients in the ataxia clinic. I feel very fortunate to be engaged in work that has given me so much joy for many years!

What do you personally associate with the ELH?

The work environment is excellent—supportive, knowledgeable, and inspiring. The scientific exchange at the ELH is extremely collegial and constructive, with a strong spirit of collaboration.

If you could talk to a historical figure, who would it be and what would you talk about?

I would choose Sir Gordon Holmes, a famous neurologist who worked in the UK and spent a couple of years conducting research in Germany. Sir Gordon Holmes wrote classic papers on cerebellar symptoms in humans. I would love to talk to him about his experiences diagnosing and treating cerebellar diseases, and to hear his insights into the physiology and pathophysiology of the cerebellum. I would like to learn how he approached questions that are still relevant in clinical neuroscience today.

Franziska Günther

"It's important to build bridges, promote dialogue, and ensure that everyone is heard and valued."

Dr. Franziska Günther joined the ELH in 2022 as manager. She holds a PhD in Geography and a Masters in Business Administration.

Under her lead, the ELH launched several projects like the Lunch Talk series, the ARTifact art competition and the Early Career Researchers initiative.

You originally studied geography. What drew you to that field initially?

At school, I had an incredibly inspiring and dedicated geography teacher. She was truly passionate about her subject, and through her lessons geography became, for me, a way of understanding the world. At university, I wanted to further explore what holds the world together at its core, as Goethe so beautifully puts it in *Faust*. Geography offered exactly that: the chance to understand natural systems, human interactions and the connections between them.

Tiananmen Square, Beijing, China (2009)

What motivated you to switch to the administrative side of science after you gained your doctorate, rather than pursuing a career in research?

In my doctoral research, I investigated how the Asian monsoon developed on the Tibetan Plateau. After completing my doctorate, I remained in academia for a few more years as a postdoc. The work also included a lot of administrative tasks like organising fieldwork in Asia, which I greatly enjoyed. This led me to pursue that path further, and I completed a Master of Business Administration, subsequently switching to the administrative side of science. That said, my heart still very much belongs to science. My goal is to support researchers and create the best possible conditions for them to carry out outstanding research.

What is the most challenging aspect of managing an interdisciplinary institute like the ELH?

The greatest challenge — and at the same time the greatest strength — of an interdisciplinary institute like the ELH is bringing together different perspectives, methods and sometimes academic cultures. It's important to build bridges, promote dialogue, and ensure that everyone is heard and valued. Achieving this balance can be demanding, but it's also what makes interdisciplinary collaboration so rewarding.

What was your first impression of the ELH?

What struck me first was the extraordinary location. Reaching the ELH already felt a little special.

From the very beginning, I sensed a strong commitment to collaboration, particularly the close German-Dutch cooperation that shapes the institute's profile. My first impression was one of openness and genuine enthusiasm. I felt that people were not only highly competent in their respective fields, but also approachable and supportive.

You enjoy musical theatre. If someone had no experience with musical theatre at all, which show would you recommend to them?

There are so many wonderful productions that it's difficult to choose just one. However, the first show that comes to mind is *The Hunchback of Notre Dame*, based on Victor Hugo's world-famous novel. The show has everything: unforgettable Disney songs, powerful choral music, magnificent costumes and impressive stage designs. It also conveys timeless themes such as solidarity, humanity, compassion and inclusion — values that should never lose their relevance and are particularly important again nowadays.

"Ideally, all PhD students at German universities would be part of a network of students and supervisors who help each other."

M.Sc. Jana Theisejans is a PhD student in Matthias Brand's PI group "Cognitive Neuroscience". Their research focuses on behavioral addictions and affective and cognitive mechanisms of decision making.

Early Career Researcher Representatives

Jana Theisejans

Why did you decide to pursue a PhD?

I decided to pursue a PhD because of my interest in psychology. Furthermore, fundamental research on behavioral addictions, particularly problematic internet usage, is crucial in our technology-driven society. I am highly interested in understanding the underlying mechanisms and influencing factors of problematic internet use. I hope our research will help classify e.g. problematic buying-shopping, and social network use as official disorders and help develop long-term therapeutic approaches.

You have been an Early Career Representative at the ELH since 2025. What are your overall wishes regarding the support and supervision of PhD students at German universities?

At the ELH and in our research group, FOR2974, PhD students receive a lot of support, and they form a good team. Ideally, all PhD students at German universities would be part of a network of students and supervisors who help each other.

How do you experience working at the ELH?

The working environment is very pleasant. You receive a lot of support and have the opportunity to learn a huge amount. Of course, the opportunity to conduct a fMRI study is also really cool and exciting.

If you could ask a famous person a question, who would that person be and what would your question be?

Of course, I would like to ask Erwin L. Hahn a question. ;-) I would ask him how he feels about his basic research from decades ago becoming the basis for imaging techniques such as MRIs. I would also ask him what his greatest wish is for our current research at ELH.

2012: Before she had to quit due to an injury, Jana was an avid football player

M.Sc. Aditya Balkrishna Umarjikar holds a Computational Neuroscience and Cognitive Robotics M.Sc. and currently works as a PhD student. A member of Dagmar Timmann's research group, he investigates how the cerebellum contributes to reinforcement learning.

"There's a quiet, focused energy, people are very calm but extremely sharp, and you immediately sense that high standards are normal here."

Early Career Researcher Representatives

Aditya Balkrishna Umarjikar

You did your Master's degree at the University of Birmingham, then worked at the Indian Institute of Technology Madras for two years and now you're pursuing a PhD in Germany. How do you experience the different scientific environments?

The University of Birmingham really trained me to slow down and go deep, to sit with a question long enough to understand the why behind it, build intuition from first principles, and be comfortable saying "I don't fully get this yet" until the concept actually clicks.

At IIT Madras, the mindset shifted more toward execution and translation. It felt much more application-oriented, taking what I knew and making it work in the real world, often under practical constraints like timelines, engineering trade-offs, and "does this solution actually hold up when we test it?"

Now, in my PhD in Germany, I am experiencing what feels like a blend of both worlds. There is the same emphasis on fundamentals and clean reasoning, but also a clear expectation that the theory should serve a well-designed study and a convincing line of evidence. What stands out most to me is the depth of methodological discipline, everything from planning and documentation to reproducibility, controls, and how carefully claims are framed.

Is there something that German universities can learn from the UK or India in terms of promoting/fostering their students?

Germany already has a very strong research culture, excellent infrastructure, depth, and methodological rigor. If I had to add anything that could further support students, I would borrow two things from my experiences in the UK and India.

From the UK, many programs put more structured emphasis on the broader "researcher toolkit": scientific writing, presenting, basic grant skills, and career development. From India, I would bring in the strength of peer culture. In many Indian institutes, a lot of growth happens through informal problem-solving, daily discussions, and shared spaces, students learn from each other constantly.

As a school student in India in 2015

What was your first impression of the ELH?

Honestly, my first impression of the ELH was: this is exactly the kind of place I used to imagine when I thought of cutting-edge neuroscience. Walking in and knowing I would be working with 7T fMRI felt like a dream come true. What struck me most wasn't just the technology, but the culture. There's a quiet, focused energy, people are very calm but extremely sharp, and you immediately sense that high standards are normal here.

Is there something you really want to do in 2026 – professionally or privately?

Professionally, in 2026 I want to become even more disciplined and methodologically rigorous, not just in running experiments, but also in planning, documentation, and consistency in my day-to-day work.

Privately, I started the year by completing my first half marathon. Now I want to keep building on that ideally move toward a full marathon.

ELH Through the Years

The grand opening of the ELH in 2006. You might find some familiar faces in the crowd.

Above: The first 7 Tesla MRI scanner arrives at the ELH in 2006.

Left: What would become the ELH. The former control centre of the coking plant under construction in 2005.

Below: The ELH's iconic conference room looking a little different in 2006.

Left: From the beginning, working on the MRI system's hardware, such as developing new coils, has been fundamental at the ELH, often leading to groundbreaking results.

Below: Opening the doors to the public happens regularly, as here in 2016.

Below: An incredible honour: In 2009, Erwin L. Hahn visited the institute that bears his name.

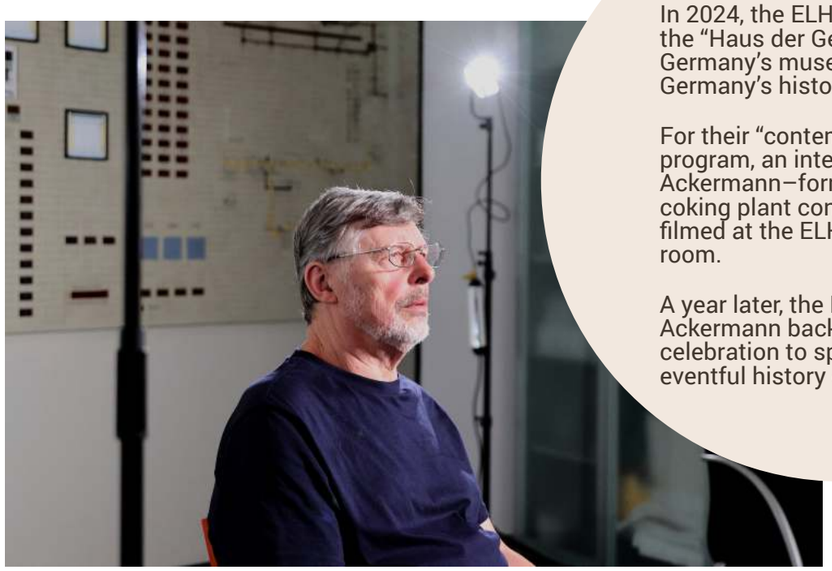
(L to R: Mark Ladd, David Norris, Erwin Hahn, Matthias Brand)

In 2020, the DFG approved the funding of a new 7 Tesla MRI system to ensure the ELH could continue with its cutting-edge research.

The photo above captures the arrival of the new MRI system in autumn 2020. The photo to the right shows it fully installed and ready.

Right: For our lunch talks and workshops, we make the barbecue happen come what may. Even in rain.

Below: The audience at the 2017 Erwin L. Hahn Lecture & Workshop at the Oktogon on Zollverein. The location has quickly become a favourite among ELH members and attendees.



In 2024, the ELH was approached by the “Haus der Geschichte”, Germany’s museum about Germany’s history post 1945.

For their “contemporary witness” program, an interview with Martin Ackermann–former foreman of the coking plant control centre–was filmed at the ELH’s conference room.

A year later, the ELH invited Ackermann back for its birthday celebration to speak about the eventful history of the building.

Left: In 2025, the rectorates of both the University of Duisburg-Essen and the Radboud University in Nijmegen visited the ELH. They were joined by the ELH’s directorate and PIs.

Below: To raise awareness for dementia, in 2023 the ELH members participated in the “bathrobe challenge”.

Below: ELH members in 2024 at the Erwin L. Hahn Lecture & Workshop.

Project Highlights From the Past 20 Years

Over the past 20 years, a manifold of projects have been realised at the ELH, leading to the development of cutting-edge technology and new insights into the human physiology and psychology.

Six projects from the past 20 years from across the board and including all our current PIs are highlighted on this spread. A complete overview of past and present projects at the ELH is available on our website, hahn-institute.de.

EU

ILLUMINATE: Increasing Lutetium production, while leveraging metabolic imaging to enhance theranostics effectiveness (2024 - 2028)

Involved ELH PIs: T. Scheenen

ILLUMINATE is a collaborative research program which aims to demonstrate the unique value of Metabolic Magnetic Resonance Imaging (MeMRI), used to visualize chemical processes in the body to significantly improve effective application of theranostics - an approach combining diagnosis, treatment, and continuous follow up of a condition.

DFG

CRC/TRR 289: Treatment Expectation (2020 - 2028)

Involved ELH PIs: U. Bingel, D. Timmann

How do positive and negative patient expectations affect the treatment outcome? This CRC aims to unlock the neurobiological and psychological mechanisms behind treatment expectation effects and how they vary between patients, and examine how the results can be applied to everyday clinical practice.

DFG

FOR 2974: Affective and cognitive mechanisms of specific Internet-use disorders (ACSID) (2020 - 2027)

Involved ELH PIs: M. Brand

The research team seeks to contribute to a better understanding of the fundamental affective and cognitive mechanisms, which are involved in the development and the maintenance of predominantly online addictive behaviors, namely pathological gaming, pornography use, buying-shopping, and social-networks use.

DFG

CRC 1280: Extinction Learning (2017 - 2029)

Involved ELH PIs: N. Axmacher, U. Bingel, O. Güntürkün, H. Quick, D. Timmann

In 19 sub-projects, the members of the CRC 1280 try to understand how the brain forgets. In 2025, the DFG granted the CRC a third funding period. Its researchers combine behavioral, neural, genetic and clinical approaches to understand the mechanisms of extinction learning.

DFG

German ultrahigh field imaging (GUFI), Core Facility (2013 - 2021)

Involved ELH PIs: M.E. Ladd, D. Norris, H.H.Quick

The project's aim was to create and promote a nationwide network of UHF MRI sites, to encourage communication between all UHF MRI locations in Germany, advance joint research, and facilitate standardization and coordination/organization of access to UHF MRI systems for scientists. The project was hugely successful with long-lasting effects.

European Research Council

MRexcite: Unlocking the potential of ultra-high-field MRI through manipulation of radiofrequency excitation fields in human tissue (2012 - 2017)

Involved ELH PIs: M.E. Ladd

In cooperation with the German Cancer Research Center, the goal of the project was to develop a highly optimized 32-channel transmit/receive RF coil for body MRI at 7T, using it to exploit and manipulate the complex RF field patterns at 7T using parallel transmission approaches. The developed coil was the first coil that allowed whole-body MRI scans at 7T worldwide.

ARTifact 2025 - Imaging MRI

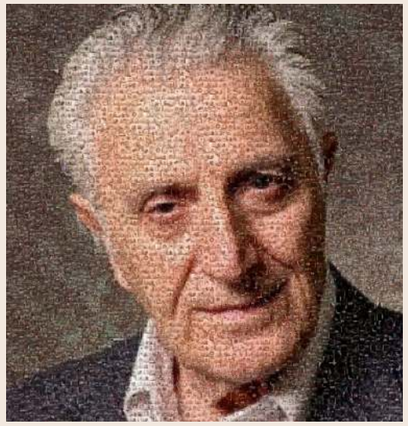
Once again the ELH set out to prove that art and science are a marvellous combination, and called for submissions for a new rendition of the "ARTifact - Imaging MRI" contest. Matching the ELH's anniversary, the prompt was "Happy birthday, ELH!".

Here are the contributions.

How the ELH was found(ed)
Marcel Gratz

The animated video is available for your viewing pleasure here.

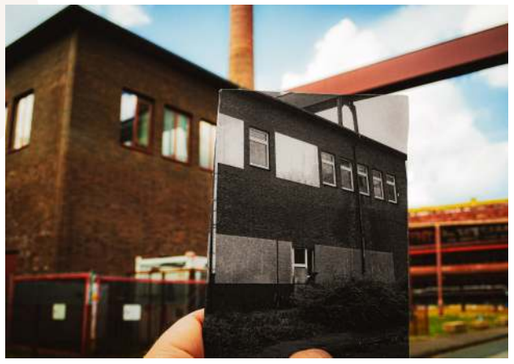
The Creation of the ELH
Franziska Günther



Mosaic of Erwin Louis Hahn – Pioneer of magnetic resonance imaging
Kim Jotzo

Meet us on the roof
Annika Verheyen, Carolin Stevens, Oliver Kraff, Fabian Bräuer, Stefan Maderwald

Celebration! 20 Years of Erwin L. Hahn Institute
Greta Wippich



Now & Then
Stefanie Zurek

Erwin L. Hahn Lecture & Workshop 2025

Behind the scenes.

Rector José Sanders from Radboud University in Nijmegen and rector Barbara Albert from the University of Duisburg-Essen–pictured here with Guillen Fernandez, vice-dean and head of Radboud institute for medical innovation and the ELH directorate and PIs - welcomed the attendees and delivered congratulations on the ELH's 20th anniversary.

Cupcakes with the ELH logo.

The Erwin L. Hahn Lecture & Workshop is always a good occasion to catch up with friends and colleagues.

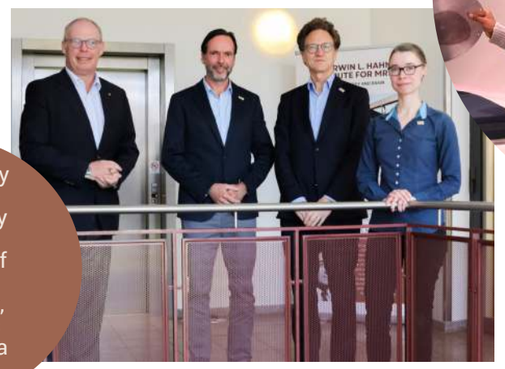
Keynote by Larry Wald from Harvard University, Erwin L. Hahn's last PhD student.

View from the stage.

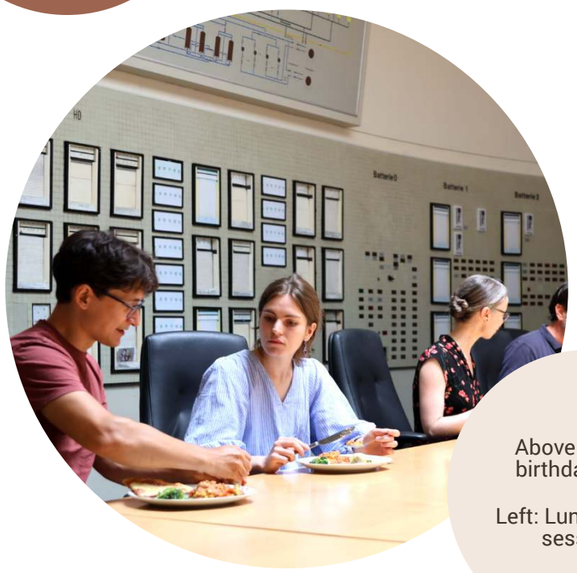
2025 - A Year in Pictures

ELH workshop with Nikolai Avdievich.

Girls' Day 2025: Guided by Oliver Kraff, a girl experiences the magnetic field with the help of an aluminum plate.



The University of Duisburg-Essen's newly elected chancellor Ulf Richter with Harald Quick, David Norris and Franziska Günther.



Above: Happy birthday, ELH!

Left: Lunch talk in session.

Meet the ELH's neighbours for the summer.

Above: During the FISU games, some athletes visit the ELH.

Right: Kick-off event of the ELH's Early Career Researchers initiative.

Below: Farzad Jabbarigargari delivers a lunch talk.

Below: Success! Annika Verheyen and Carolin Stevens design the ELH's very own trophy with help of the 3D printer.

Current Grants

DFG

N. Axmacher
CRC 1280 (A02): Neural mechanisms of context generalization (3. FP) *(2026 - 2029)*

N. Axmacher, E. Genc
CRC 1280 (A03): Functional role and dynamic change of extinction network connectivity (3. FP) (*2026 - 2029)*

N. Axmacher, D. Timmann, R. Kumsta, T. Spisák
CRC 1280 (F02): Focus group Neuroimaging and Genetics (3. FP) *(2026 - 2029)*

U. Bingel, K. Schmidt
CRC 1280 (A11): Appetitive and aversive pain-related learning in health and chronic back pain (3. FP) *(2026 - 2029)*

U. Bingel
CRC/TRR 289: Treatment Expectation (2. FP) *(2024 -2028)*

M. Brand
FOR 2974: Affective and cognitive mechanisms of specific Internet-use disorders (ACSID) (2. FP) *(2024 - 2027)*

S. Cheng, O. Güntürkün, M. Üngör
CRC 1280 (F01): Focus Group Learning Dynamics (3. FP) *(2026 - 2029)*

O. Güntürkün
CRC 1280 (A01): Extinction in the 4th dimension (3. FP) *(2026 - 2029)*

H.H. Quick, F. Mauconduit, N. Avdievich
UHF-NeuroBOOST: Novel pTx-optimized RF Array Coils for Head and Neck MR Imaging at Ultra-High Field of 7T, 9.4T, and 11.7T *(2025 - 2028)*

D. Timmann, H.H. Quick
CRC 1280 (A05): The contribution of the cerebellum to extinction: instrinsic mechanisms and cerebello-cerebral interactions (3. FP) *(2026 - 2029)*

D. Timmann
CRC/TRR 289 (A17): How does the cerebellum contribute to placebo hypoalgesia and nocebo hyperalgesia? (2. FP) *(2024 - 2028)*

D. Timmann, U. Bingel, M. Brand
Involvement of the human cerebellum in reinforcement learning via its connection with the ventral tegmental area (VTA) *(2023 - 2026)*

EFRO/EU

N. Axmacher
Neural mechanisms, functional roles and pathophysiological relevance of human grid cell-like representations *(2020 - 2025)*

H.H. Quick, T. Scheenen, D. Klomp
MITI: Non-ionizing Metabolic Imaging for predicting the effect of and guiding Therapeutic Interventions *(2022 - 2025)*

T. Scheenen, K. Herrmann
ILLUMINATE: Increasing Lutetium production, while leveraging metabolic imaging to enhance theranostics effectiveness *(2024 - 2028)*

D. Timmann
Marie Skłodowska-Curie Innovative Training Network (ITN): Cerebellum & Emotional Networks (CEN) *(2021 - 2025)*

MERCUR

O. Güntürkün, U. Bingel, M. Brand
ReThink *(2022 - 2026)*

NWO

R. Cools, D. Norris, W. Schellekens
Unravelling dopamine's role as gatekeeper of prefrontal cortex *(2022 - 2027)*

Selected Publications

Ahmadi K, Swegle S, Kashyap S, Bouyeure A, Bandettini P, Axmacher N, Huber, LR. Blood volume sensitive laminar fMRI with VASO in human hippocampus: Capabilities and biophysical challenges at clinical 7T scanners. *bioRxiv*

Antons S, Brandtner A, Oelker A, Trotzke P, Wegmann E, Brand M, Müller SM. Psychometric evaluation of a trans-addiction craving questionnaire: The Craving Assessment Scale for Behavioral Addictions and Substance-use Disorders (CASBAS). *Addiction*.

Antons S, Müller SM, Thomas TA, Schmid AM, Kessling A, Joshi M, Krikova K, Kampa M, Mallon L, Schmidt LD, Klein L, Dominick N, Büsche K, Oelker A, Brandtner A, Montag C, Wölfling K, Wolf OT, Klucken T, Rumpf HJ, Steins-Loeber S, Stark R, Müller A, Diers M, Wegmann E, Brand M. Cue reactivity towards distal cues in specific types of problematic usage of the internet: findings from diagnostically validated samples. *British Journal of Psychiatry*.

Brand M, Antons S, Bothe B, Demetrovics Z, Fineberg NA, Jimenez-Murcia S, King DL, Mestre-Bach G, Moretta T, Müller A, Wegmann E, Potenza MN. Current Advances in Behavioral Addictions: From Fundamental Research to Clinical Practice. *American Journal of Psychiatry*.

Brand M, Müller A, Wegmann E, Antons S, Brandtner A, Müller SM, Stark R, Steins-Loeber S, Potenza MC. Current interpretations of the I-PACE model of behavioral addictions. *Journal of Behavioral Addictions*.

Chan KS, Zwiers MP, Jansen MG, Johansson ME, Helmich RC, Oosterman JM, Norris DG, Beckmann CF, Marques JP. Normative trajectories of R 1 , R 2 *, and magnetic susceptibility in basal ganglia on healthy ageing. *Imaging Neuroscience*.

de Kloe TJ, Fazal Z, Kohn N, Norris DG, Menon RS, Llera A, Beckmann CF. Time-resolved instantaneous functional loci estimation (TRIFLE): Estimating time-varying allocation of spatially overlapping sources in functional magnetic resonance imaging. *Imaging Neuroscience*.

Fiedler TM, Ladd ME, Orzada S. Local and whole-body SAR in UHF body imaging: Implications for SAR matrix compression. *Magnetic Resonance in Medicine*.

Grimm JA, Aigner CS, Dietrich S, Orzada S, Fiedler TM, Schmidt S, Schorling C, Quick HH, Nagel AM, Ladd ME, Schmitter S. In Vivo 3D Liver Imaging at 7 T Using kT-Point pTx Pulses and a 32-Tx-Channel Whole-Body Radiofrequency Coil Array. *NMR in Biomedicine*.

Hidalgo-Gadea G, Güntürkün O, Behroozi M. The impact of machine learning on ethological neuroscience. *Frontiers in Behavioral Neuroscience*.

Kessling A, Müller A, Wolf OT, Merz CJ, Brand M, Wegmann E. Effects of acute psychosocial stress on cue-reactivity, attentional bias and implicit associations in women with problematic social network use: An experimental study. *Addiction*.

Kessling A, Müller SM, Müller A, Brand M, Wegmann E. General executive functions, stimulus-specific inhibitory control and predisposing variables of individuals with problematic social network use. *Addictive Behaviors*.

Kraff O, May MW. Multi-center QA of ultrahigh-field systems. *MAGMA*.

Kutscha N, Mahmutovic M, Bhusal B, Vu J, Chemlali C, Hansen SJD, May MW, Knake S, Golestanirad L, Keil B. A deep brain stimulation-conditioned RF coil for 3T MRI. *Magnetic Resonance in Medicine*.

Kunkel A, Schmidt K, Hartmann H, Strietzel T, Sperzel J-L, Wiech K, Bingel U. Nocebo effects are stronger and more persistent than placebo effects in healthy individuals. *eLife*.

Liermann-Koch C, Thielen JW, Chang DI, Krieger-Strásky R, Kraff O, Scherbaum N, Sprooten E, Müller BW. Corollary discharge and efference copy mechanisms in schizophrenia and controls: The N1 and P2 evoked potential components differentially react to self-initiated tones in schizophrenia. *PLoS One*.

Lindemann ME, Gratz M, Grafe H, Jannusch K, Umutlu L, Quick HH. Systematic evaluation of human soft tissue attenuation correction in whole-body PET/MR: Implications from PET/CT for optimization of MR-based AC in patients with normal lung tissue. *Medical Physics*.

Müller SM, Antons S, Schmid AM, Thomas TA, Kessling A, Joshi M, Krikova K, Kampa M, Mallon L, Schmidt LD, Klein L, Dominick N, Büsche K, Oelker A, Brandtner A, Montag C, Wölfling K, Wolf OT, Diers M, Klucken T, Rumpf HJ, Stark R, Müller A, Wegmann E, Steins-Loeber S, Brand M. Self-control abilities in specific types of problematic usage of the Internet: Findings from clinically validated samples with neurocognitive tasks. *American Journal of Psychiatry*.

Müller A, Joshi M, Kessling A, Erdal N, Tilk K, Merz CJ, Wolf OT, Wegmann E, Brand M. Effects of acute stress on cue reactivity and implicit cognitions in online compulsive buying-shopping disorder. *Journal of Behavioral Addictions*.

Nio E, Pereira PP, Diekmann N, Petrenko M, Doubliez A, Ernst TM, Batsikadze G, Maderwald S, Deuschl C, Üngör M, Cheng S, Merz CJ, Quick HH, Timmann D. Human cerebellum and ventral tegmental area interact during extinction of learned fear. *eLife*.

Orzada S, Fiedler TM, Kesting J, Hubmann MJ, Ladd ME. On the measurement errors in SAR supervision introduced by directional couplers. *MAGMA*.

Pakusch J, Nio E, Grosch T, Ernst TM, Batsikadze G, Güntürkün O, Timmann D, Mark MD. Evidence for lateralization of fear emotions in the cerebellum. *Journal of Neurology*.

Pfaffenrot V, Bouyeure A, Gomes CA, Kashyap S, Axmacher N, Norris DG. Characterizing BOLD activation patterns in the human hippocampus with laminar fMRI. *Imaging Neuroscience*.

Pham SDT, Chatziantoniou C, van Vliet JT, van Tuijl RJ, Bulk M, Costagli M, de Rochefort L, Kraff O, Ladd ME, Pine K, Ronen I, Siero JCW, Tosetti M, Villringer A, Biessels GJ, Zwanenburg JJM. Blood Flow Velocity Analysis in Cerebral Perforating Arteries on 7T 2D Phase Contrast MRI with an Open-Source Software Tool (SELMA). *Neuroinformatics*.

Scheenen TWJ, Fortuin AS, Oprea-Lager DE, de Rooij M. The Current and Future Role of MRI and PSMA-PET/CT in Diagnosing Oligometastatic Prostate Cancer. *Investigative Radiology*.

Steins-Loeber S, Schmid AM, Thomas TA, Oelker A, Müller A, Brand M. The Pavlovian-to-instrumental transfer effect as predictor of problematic Internet gaming: Results of a longitudinal study. *Journal of Behavioral Addictions*.

Wang Y, May MW, Gratz M, Ladd ME, Orzada S. Ultimate Intrinsic SNR in the Torso of Realistic Body Models. *Magnetic Resonance in Medicine*.

Wegmann E, Antons S, Schmidt LD, Klein L, Montag C, Rumpf HJ, Müller SM, Brand M. Feels good, and less bad: Problematic use of the Internet is associated with heightened experiences of both gratification and compensation. *Journal of Behavioral Addictions*.

Awards

Ulrike Bingel: Stern Magazine Top Physicians

Matthias Brand: Highly Ranked Scholar Lifetime in the Specialty Addiction, ScholarGPS

Matthias Brand: Best Paper Bronze Prize of the International Society for Sexual Medicine

Onur Güntürkün: Professor of the Year, selected by the Unicum Foundation

Oliver Kraff: MRM Distinguished Reviewer

Enzo Nio & Patrick Pais Pereira: Treasure Chest funding of the CRC 1280

Harald H. Quick: ISMRM Safety Committee

Dagmar Timmann: Member of the DFG Fachkollegium 2.23 Neurowissenschaften, 2024-2028

Luca Wessing, Markus May, Oliver Kraff, Harald Quick: ISMRM Summa Cum Laude Merit Award for "An Anatomically Shaped 16-channel Receive Array Coil for UHF Shoulder Imaging at 7T"

Yuting Wang, Markus May, Mark Ladd, Stephan Orzada: ISMRM Magna Cum Laude Merit Award for "Ultimate intrinsic SNR in the torso of a realistic body model"

Invited Talks

Antoine Bouyeure: “The neural mechanisms of unwanted trauma memories", European Congress of Neuropsychopharmacology, Amsterdam

Oliver Kraff: “Clinical UHF safety at 7T”, ISMRM Workshop on MR Safety, Berlin

Oliver Kraff: “Exploring Implant Safety & Its Management: Ensuring Access at 7T”, DKFZ - Medical Physics Seminar, Heidelberg

Harald H. Quick: “Implants. From Science to Clinical Practice”, ISMRM Workshop on MR Safety, Berlin

Harald H. Quick: “Safe MRI – Despite cardiac pacemakers and ICD”, Bayer MTR-Academy, Iserlohn

Enzo Nio & Dagmar Timmann: “Fear extinction and the cerebellum”, Johns Hopkins Cerebellum Seminars (Reza Shadmehr)

Dagmar Timmann: "Human Cerebellum in Fear Learnung and Defensive Response”, NeuroFrance 2025 meeting, Montpellier, France

Bachelor & Master’s Theses

Kaan Karatay: Entwicklung und Evaluation von Sendespulen für die 7-Tesla-Magnetresonanztomographie. Bachelor Thesis, Medical Engineering at University of Duisburg-Essen

Maya Metzger: Bone Mineral Density Measurement in the Presence of Iodine-based Contrast Agent in Photon-counting Computed Tomography. Bachelor Thesis, Medical Engineering at University of Duisburg-Essen

Ahmed Habeel: Charakterisierung und Optimierung einer 16-Kanal Empfangsspule für die Magnetresonanzbildgebung der Schulter bei 7 Tesla. Bachelor Thesis, Medical Engineering at University of Duisburg-Essen

Picture Credits

Axmacher, Nikolai: 10, 11

Bingel, Ulrike: 12, 13

Brand, Matthias: 15

ELH: 2, 4, 7, 8, 9, 14, 20, 22, 28, 30, 32, 34–39, 41, 44–47, 53, 55

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Wippich, Greta: Title Page

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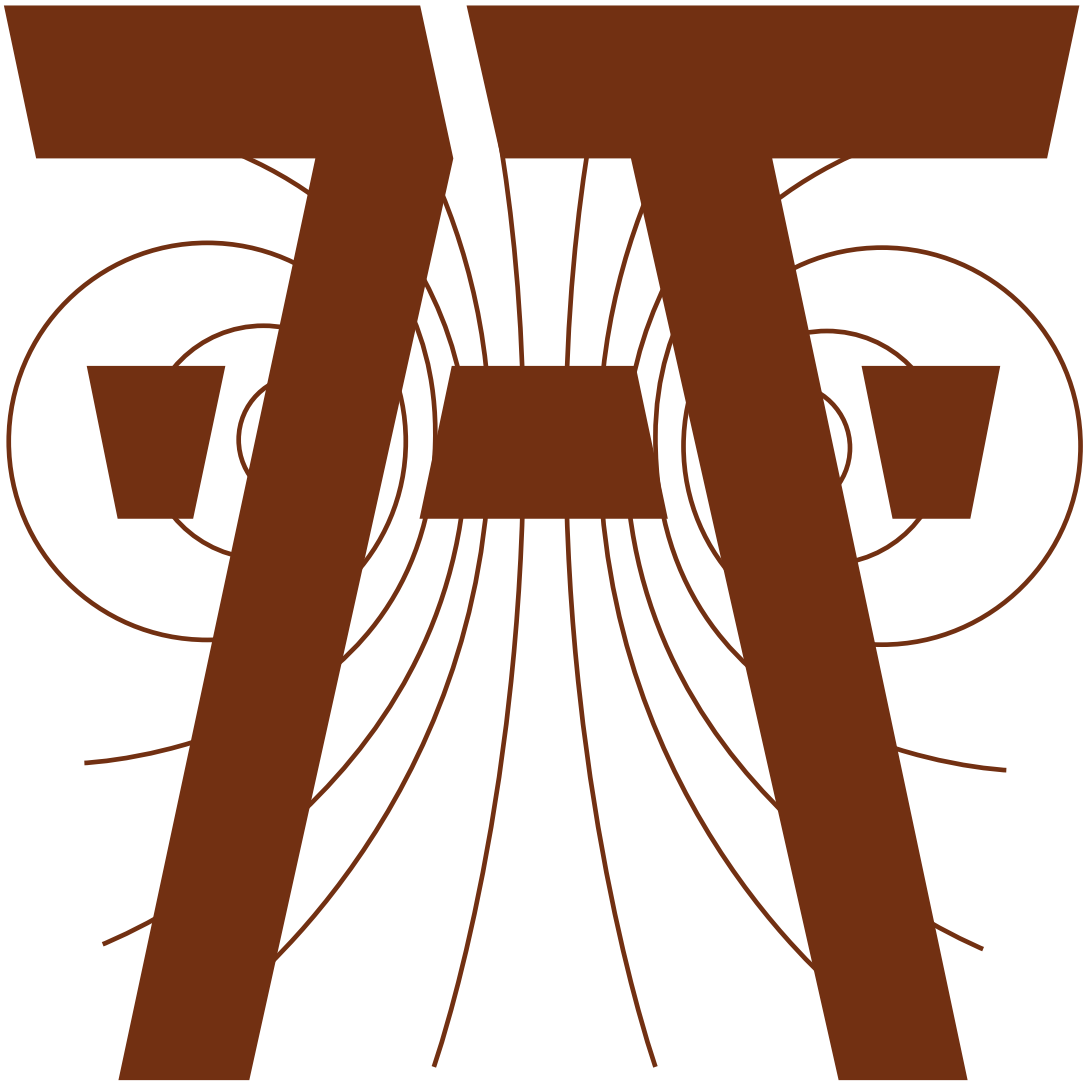

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