Karlsruhe Institute of Technology

YIN Insight 2016/17

The strong network of junior professors and junior research group leaders at KIT

Young Investigator Network (YIN)

Hot Topic: Too mature for tenure?
State university laws expel many junior group leaders from tenure track professorships

Scientific Highlights
9 ERC grantees among YIN members & alumni

YIN Statistics 2016/17
5.8 million euro subsequent funding and 301 weekly course hours

Editorial

Dear Reader,

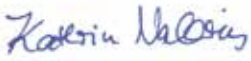
After almost a decade now the Young Investigator Network (YIN) remains a unique, strong and independent network, representing junior research group leaders and junior professors at KIT. YIN serves as a platform to connect, educate and interact. It provides an outstanding program of higher education to its members and supports interdisciplinary collaboration. Moreover, it enables young research group leaders and junior professors to meet each other on a regular basis and thus, offers a chance for an open scientific exchange, both professionally and personally. This year changes have taken place with the new Tenure Track Program and the first round of the Excellence Strategy Program. Here, we as young investigators are directly impacted, but are also able to take part and, especially as YIN, we can speak with a common voice and help to shape a better future.

Following on the pages of YIN Insight 2016/17, you will find reviews of the Tenure Track Program and of the KIT Associate Fellow as part of the Excellence Strategy Program. Additionally, you will get information on the YIN grants fostering collaborations among young investigators from different scientific branches. We also report about the YIN Lectures with internationally highly renowned speakers. They have become extremely popular attracting more and more visitors. Furthermore, we report about current highlights in the YIN continuous education program.

Being a living network, YIN changes. This is mirrored in this journal through facts, figures, and new faces. New facts and figures show the amount of work and goals achieved by the YIN, e.g. the amount of subsequent funding acquired and the number of weekly course hours' taught. Next to the mentioned topics, we report about successful acquisition of prestigious grants, upcoming events, and finally, introduce our new members and the ever-growing list of alumni. YIN Insight has been a collaborative effort and we thank all individuals for their contributions.

We wish you an interesting and enjoyable read,
the PR Committee



Dr. Stefanie Betz Dr. Dominic Bresser Dr. Andreas Haupt Dr. Kathrin Valerius

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Greetings

Young Investigators, who find a unique platform for the democratic representation of their interests at the Karlsruhe Institute of Technology (KIT), contribute significantly to research in Germany. The YIN members are extremely successful in leading their third-party funded independent research groups in a wide variety of scientific areas, regularly resulting in numerous awards and distinctions. This is because the YIN guarantees them quality on a high level and ensures that their ideas contribute to the scientific community. Therefore, it is in the interests of the research department at the Ministry of Science of the State of Baden-Württemberg that the Young Investigators continue to be provided with the best possible conditions at the KIT.

Attractive, transparent and predictable career paths are a crucial prerequisite for universities to remain competitive in recruiting young scientists compared to industry, non-university research and foreign scientific institutions. In 2014 Baden-Württemberg was the first federal state which implemented the recommendation of the advisory council on scientific matters regarding the introduction of the Tenure Track Professorship as a reliable career path to professorship. Allowing for independence at an early stage and self-responsibility in science research are both features of junior professorships and junior research group leadership. This allows for more reliable and predictable career tracks. The commitment of a binding tenure track requires a quality management concept coordinated with the Ministry of Science, which offers a permanent W 3 professorship at a later stage without requiring a new job advertisement or application process dependent solely on a successful evaluation. With this new category of staff, our universities are well positioned for the Tenure Track program. Furthermore, Tenure Track Professorships are not only attractive to young scientists at the beginning of their scientific career. The offer of a tenure track professorship can be an attractive career step for a junior professor who has not yet been granted an initial tenure pledge. The same also applies to junior research group leaders who, on the basis of their already proven academic excellence, can be counted on to be taken on a permanent W 3 professorship by appealing to a tenure track professorship.

However, the state supports young scientists not only structurally, but also financially: through doctoral scholarships, the promotion of doctoral theses, and the Margarete von Wrangell habilitation program, designed especially for highly qualified women on their way to professorship. Through an additional funding program, junior professors are being supported with additional equipment for their research work as well. Beginning in 2018, the new federal and state program to promote additional Tenure Track Professorships will replace the former program. I congratulate the KIT, which has already won nine Tenure Track Professorships in the first round of grants under this new program.

The Tenure Track Professorship opens up new attractive career prospects for young scientists; and at the same time, it is an additional trump card for universities to play in the international competition for the best young scientists. It is, therefore, all the more gratifying that the KIT has the best chances of approval in the Tenure Track program on the way to potentially securing another six funding cases in the second round.

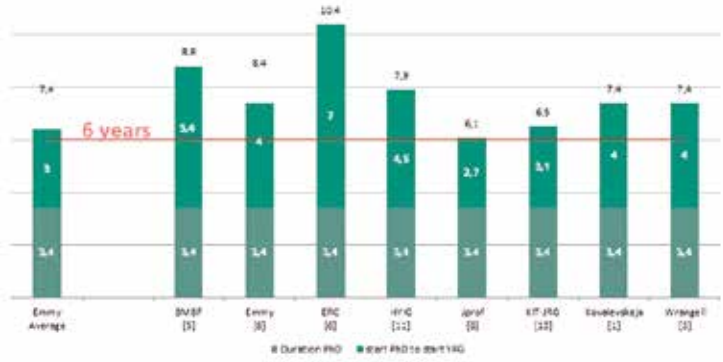
I keep my fingers crossed for the KIT and its YIN!

Dr. Simone Schwanitz
Deputy Director of the Ministry of Science, Research and the Arts of Baden-Württemberg

Too mature for tenure?

State University Laws expel many junior group leaders from Tenure Track Professorships

Transparent and more predictable career paths for young scientists and even for existing junior group leaders – this is the goal of recent higher education politics in Germany. As a first step, the administrative arrangement[1] by the federal and state governments focuses on establishing 1,000 new tenure track professorships and raising the amount of permanent professorial positions by the same number. § 4 (2) states that young PhD holders, who are already on the path towards professorship, should be adequately considered for these tenure track positions. The idea seems good, but how does it work in practice and what does it really mean for young scientists, who have progressed already slightly further in their academic career?



Sample of the career paths of YIN members [in years] before the funding for their group was granted compared to Emmy-Noether awardees from the cohort 2007/08.

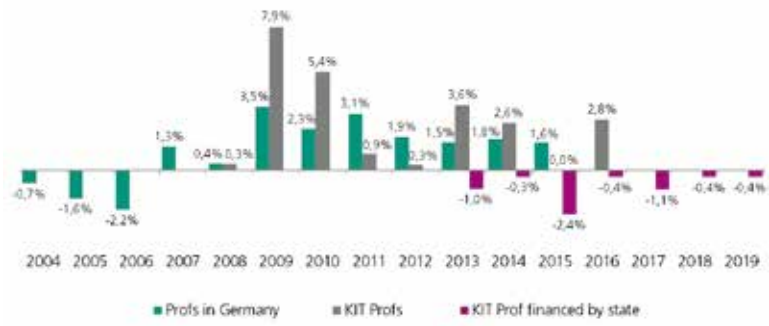
Absolute numbers of junior professors and of newly appointed W2 and W3 professors at KIT since 2007. Estimation for 2018/19 assuming that only 11 tenure track- and no other junior professors will be appointed until then (YIN database Jan 2018 and figures from annual KIT reports).

Shortly after the program was announced, the Alliance of Science and Research Organizations addressed their most prominent concerns: For one thing, the tenure track professorships might just be used for early replacement of retiring professors. Without increasing the overall number, this would lead to a shortage of available professorship positions in years to come. Another issue is the compatibility with existing funding schemes: The Tenure Track Program should not work at the expense of excellent junior scientists such as Emmy-Noether or ERC grantees, but rather allow them access and uphold the high quality standards set by these funding initiatives.[2] The prerequisites, however, are not quite identical.

Like all junior professorships, the tenure track professorships are subjected to the State University Laws (LHG), which correlates with the Federal Law on fixed-term contracts. Hence, according to the LHG Baden-Württemberg, to qualify for a junior professorship, the phase of academic employment prior to and after the dissertation may not exceed six years each.[3] As many PhD students also work as research assistants and need on average a little more than four years[4] to get their degree, junior professors tend to be quite young, having had only a relatively short postdoc phase. Emmy Noether group leaders, on the other hand, spend at least two years as postdoc, proving their scientific independence as well as gaining substantial international research experience. On average, it takes them 4 years after their PhD before they get the grant. Considering in addition a PhD phase of about 3.4 years, this means that they have already exceeded the maximum of 6 years by 1.4 years, when they start their group.[5] If they weren't on leave in accordance with the WissZeitVG[6] § 2 (5), their only saving grace might be – though not necessarily – time spent abroad as PhD student or as postdoc (WissZeitVG § 2(3)). Thus, it remains unclear when and how highly qualified group leaders can benefit from the Tenure Track Program.

The Federal Ministry of Education and Research (BMBF) provides some answers[7]: For scientists who are already on a career path towards professorship, a lateral entry into the program is possible and they should get a fair chance. Even if this means an early tenure evaluation and, thus, a shorter duration of the program funding, they ought not to encounter any disadvantages. It was, however, left to each university to define the complying regulations and proceedings as part of the overall concept with which they entered the competition for tenure track professorships. Nonetheless, these applications have been approved by now and the regulations and proceedings for lateral entry are, for the main part, not publicly available. Consequently, interested junior group leaders do not know presently what to expect.

KIT has already made a public announcement[8] including a whole paragraph on special regulations for externally evaluated or internally approved junior research group leaders. Unfortunately, the KIT neither defined clear exceptions for KIT junior research group leaders with respect to the six-year-regulation nor did it address the rule in other ways to resolve the discussed dilemma nor did it address the rule in a clear statement. Instead the announcement leaves the decision to the KIT-sectors. Thus, apparently, even the time, in which a group has already been led and which might call for an early evaluation, still counts towards the six years phase of prior employment. While this makes it quite challenging for externally evaluated group leaders to fulfill the application criteria, it renders it almost impossible



Growth rates [in % based on year prior] of professors in Germany, at KIT and KIT professors funded by state (Data compiled from the Federal Bureau of Statistics series 11, 4.4: annual KIT reports and the state budget.)

for young scientists who are already one or two years into leading their group. For them, the appeal for adequate consideration appears more of a theoretical principle rather than a real opportunity and the concern that all available positions might be used for early appointments of tenure track professors becomes painfully acute.

In fact, the overall number of professorships has increased since 2008 – both in Germany and at KIT – but the growth rate has dwindled. While KIT has managed to employ more and more professors each year, less and less of these positions have been funded by the state budget since 2013[9]. Furthermore, figures recently published in the journal 'Forschung&Lehre'[10] show that the relation between professors retiring and junior researchers qualified to take on a professorship has increased from 1:4 in 2009 to 1:7 in 2015. In addition, for many disciplines tenders noticeably dropped, e.g. for chemistry, engineering sciences, mathematics and economics. If this trend continues, the additional tenure track professorships might develop into singular road to success, diminishing all other established funding schemes. If Germany's higher education system needs more rather than less highly qualified junior scientists, the government will eventually need to install more suitable positions.

All links above were last accessed on 16th of January 2018.

[1] Cf. www.gwk-bonn.de/fileadmin/Papers/Verwaltungsvereinbarung-wissenschaftlicher-Nachwuchs-2016.pdf
[2] Cf. www.dfg.de/download/pdf/dfg_im_profil/reden_stellungnahmen/2016/161109_stellungnahme_allianz_nachwuchspakt.pdf
[3] Cf. www.landesrecht-bw.de/jportal/portal/t/d2p/page/bsbawueprod.psml/screen/JWPDFScreen/filename/HSchulG_BW.pdf
[4] Cf. www.academics.de/ratgeber/promotion-dauer
[5] Cf. www.dfg.de/download/pdf/dfg_im_profil/geschaeftsstelle/publikationen/infobriefe/ib02_2016.pdf and www.forschungsinfo.de/publikationen/download/working_paper_3_2008.pdf
[6] Cf. www.bmbf.de/files/WissZeitVG_idF_WissZeitVGAendG(1).pdf
[7] Cf. www.bmbf.de/files/FAQ.pdf
[8] Cf. www.sle.kit.edu/downloads/AmtlicheBekanntmachungen/2017_AB_033.pdf
[9] Cf. In the years prior, details on KIT have not been listed in the state budget BW: Cf. www.statistik-bw.de/shp
[10] Cf. Wirth, Angelika: Schlechte Lage stabilisiert sich. Der Stellenmarkt für Professuren und Chancen des wissenschaftlichen Nachwuchses. In: Deutscher Hochschulverband (Ed.): Forschung & Lehre 12/17 (25), p. 1064ff.

Facts and figures 2016/17

The following data was compiled from the YIN survey 2017: 41 members participated

Members

The number of YIN members has fluctuated around 60 for the past years as shown in Fig. 1. Unfortunately, since 2014 the number of YIN members has slightly decreased. This decline reflects the drop in numbers of young investigator groups (YIGs) at KIT in general. Nevertheless we have observed a slight rise in the share of female members over the years. In 2008, when YIN was founded, there were 12.8% female members, nearly doubling to 23.5% in 2009 and increasing further to 33% in 2016.

Fig.1: Number of YIN members and alumni from the foundation until the end of 2016 (YIN database, Oct. 2016)

YIN is an international network. In fact, 20% of our members have an international background (including members from Europe, America and Russia). This share has decreased compared to the previous year.

The requirement to become a YIN member is the leadership of a scientifically independent third-party funded junior research group at KIT consisting of at least one fully funded doctoral student and, in addition, a non-permanent contract.

The average age of YIN members at the start of their junior research group is 33, with the youngest member being 28 years old and the oldest 38. The term of these groups is typically between four and six years. For this reason, the average age of the current YIN members is 36, with the youngest member 30 and the oldest member 43 years old. It is not surprising that family founding and the associated balance between science and family are important topics in this age group.

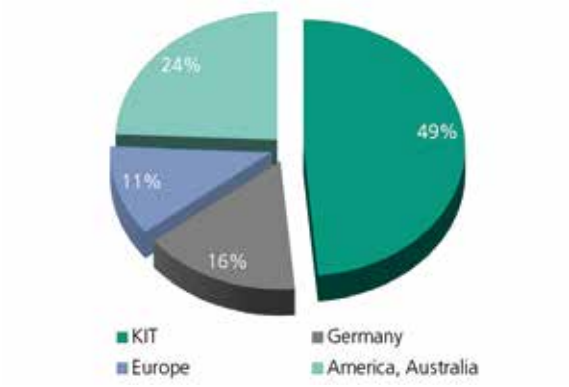


Fig. 2: Latest position of YIN members before coming to KIT (Data from survey 2017)

After leaving KIT or after obtaining a permanent position at KIT, many of its former members choose to become active YIN-alumni. Therefore, the number of associated alumni is constantly growing, having reached 88 by the end of 2016.

Before YIN members obtained their current position, most of them 83% had a postdoc position, 7% a PhD position, 5% a group leader position and 5% had a fixed term assistant professorship. 35% of all YIN members have been abroad (Europe and North America) before coming to KIT, 16% come from other German universities and 49% from KIT itself (Fig. 2).

Areas of expertise

YIN members cover four areas of research: with 48%, the majority of YIN members works in natural sciences, followed by 28% in the field of engineering, 21% in computer science and mathematics, and finally only 2% of all YIN members are employed in the area of economics and humanities (see Figure 3).

This can be explained by the different academic career paths. In engineering, for example, PhD graduates commonly work in industry for several years. Moreover, as a matter of fact, this distribution reflects the overall research profile of KIT.

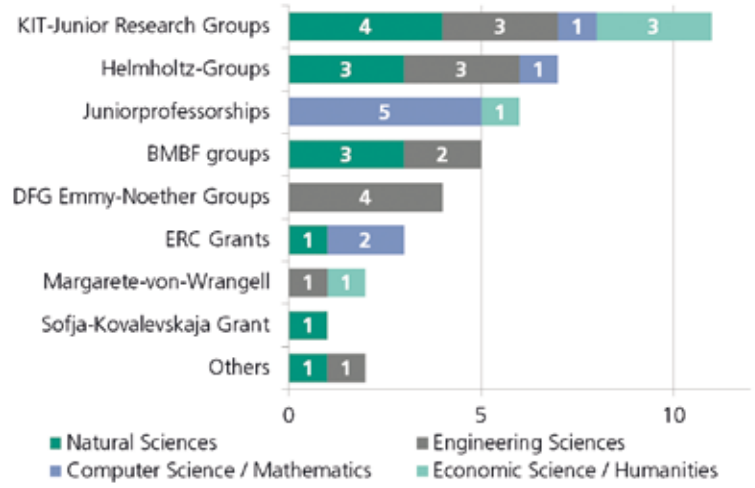


Fig.3: Distribution of YIN research groups according to the funding program and area of expertise (YIN database Oct. 2016)

Types of Junior Research Groups

YIN unites a variety of different group types and funding sources. A significant number of groups is still financed by funds allocated from KIT, i.e., 4 Young Investigator Groups (YIG), 6 KIT-Research Groups (RG) and 1 KIT Shared Research Group (SRG). The number of KIT-funded groups within YIN, however, has been further decreasing to 11 groups in comparison to 2014 (17 groups). In addition, there are 7 YIN members leading a Helmholtz Young Investigator Group that are partially funded from the Helmholtz Initiating and Networking Fund and partly by KIT and their hosting Institutes.

We have also many YIN groups that are funded entirely from external sources such as the Federal Ministry of Education and Research (BMBF) (5), the German Research Foundation (DFG) via its Emmy Noether Program (4), and the European Research Council (ERC) via a Starting Grant (3). Finally, there are 6 junior professors who are members in YIN. Other YIN groups are funded by the state of Baden-Württemberg (Margarete von Wrangell Program), by the Humboldt Foundation (Sophia-Kovalevskaja Grant) and by the EU (Marie Curie Grant). An overview of the different funding programs is shown in Fig. 3 together with the corresponding area of expertise.

Initial Funding

Our survey shows that junior research groups contribute a total of roughly 27 million euro, distributed over 3 to 6 years, towards research at KIT by their initial funding. This results in a contribution of 6 million euro per year. The funding volume of the various groups varies between 80,000 € and 2 million €. As some of the junior research groups are totally or partially funded by KIT roughly 7 million come from KIT, whereas the remaining 20 million Euro are externally funded. On the top position in terms of total funding volume is the ERC Consolidator Grant followed by other groups such as BMBF, DFG Emmy Noether and the Helmholtz Association.

Subsequent Funding

In addition to the initial funding of the groups, YIN members have acquired a substantial amount of additional funding, in total 5.8 Mio. € in 2016. The majority, about 88% of these grants, is provided by external funding agencies such as the DFG. 7% are contributed by industrial partners and the remaining 5% by KIT.

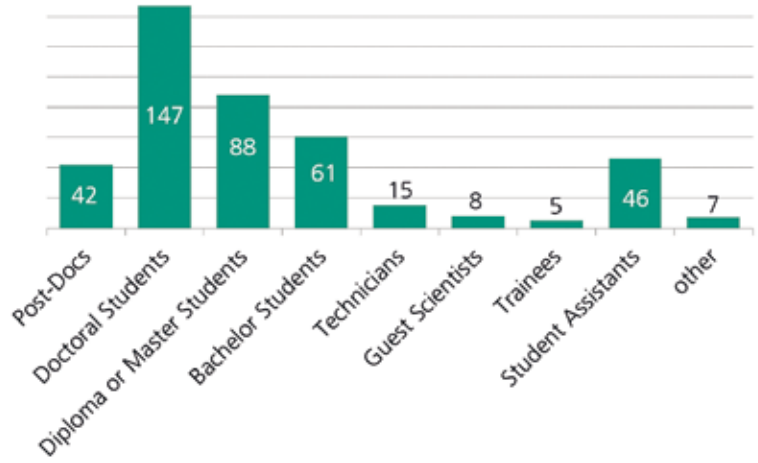


Fig 4: Number of people working in YIN groups.

Staff

The YIN groups, represented by the group leaders, provide funding for a large number of employees, a total of 426 people. The average size of a junior research group represented in YIN is 10 members. The YIN junior group leaders employ 42 postdoctoral researchers, 147 doctoral candidates, 88 Diploma/Master students, 61 Bachelor students and 46 student assistants. The groups further employ 15 technicians, 8 guest scientists and 5 trainees, as shown in Fig. 4.

Among the doctoral and postdoctoral researchers within the YIN groups, 55% originate from Germany. However, the groups are very internationally staffed, as 21% of these researchers come from Europe, 15% from Asia, and 7% from North and Central America.

[1] Lehrverpflichtungsverordnung – Verordnung der Landesregierung über die Lehrverpflichtungen an Universitäten

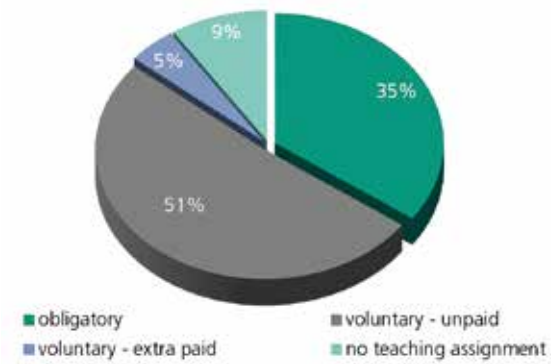


Fig.5: YIN teaching assignment

Teaching and supervised theses

Although the majority of YIN members has no teaching obligation, for most of them teaching is a substantial part of their work life. About 91% of all YIN members contribute actively towards teaching at KIT. To better illustrate this: YIN members give lectures accounting for a total of 301 semester credit hours (SWS) during the past winter (2016/17) and summer semester (2016). The 301 SWS comprise lectures (126 SWS), seminars (70 SWS), exercises (63 SWS) and practical trainings (44 SWS). Interestingly enough, however, only 35% of respondents have an obligatory teaching assignment. For 56% of the young group leaders teaching is voluntary and 9% even have no teaching assignment.

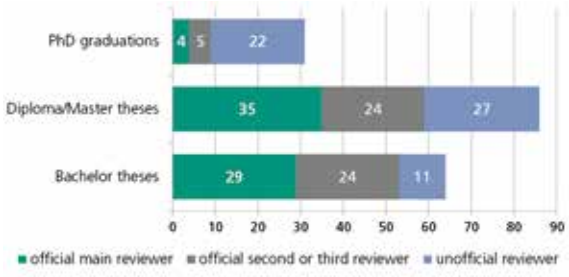


Fig 6: Number of theses supervised by YIN members in 2016

In addition to teaching, YIN members supervise doctoral students, Diploma/Master and Bachelor theses. In 2016, 31 doctoral theses, 86 Diploma and Master theses as well as 64 Bachelor theses were prepared by students in YIN groups. An overview of this data is shown in Fig. 6.

Unfortunately, the examination entitlement granted is not the same at all KIT faculties, so that only 39% of the junior group leaders have full examination rights. In contrast, 37% of the YIN members have no examination entitlement which is very difficult to handle, if you are responsible for a junior research group including personnel responsibility, but without the right to examine your students. Further 12% have the examination entitlement for doctoral students only and the last 12% have the examination entitlement for Bachelor / Master students only (Fig. 7).

Fig.7: YIN examination entitlement

Habilitation

The status of a junior group leader (Nachwuchsgruppenleiter mit Prüfungsberechtigung) was thought to replace the habilitation in future. However, the significance of the habilitation versus a junior group leader position is perceived differently in the disciplines, KIT faculties, universities and countries. Due to this, 39% of the participants still plan to pursue, 15% have completed, 22% at least think about pursuing a habilitation. Only 24% of the YIN members consider the habilitation as unnecessary for their career.

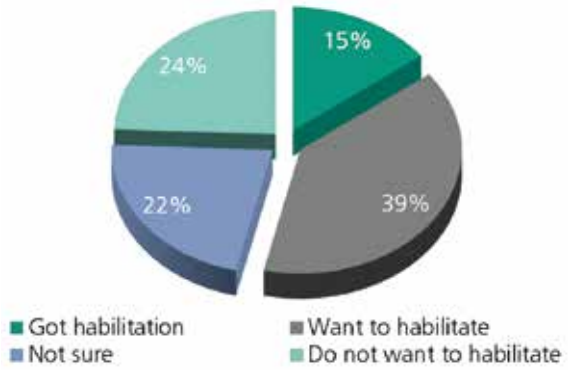


Fig 8: Habilitation as seen by YIN members

Publications, h-Index and Conferences

A total number of 240 papers and articles has been published in 2016 by the 41 groups that participated in this survey. Significant research by YIN members has been published in prestigious journals such as nature Communications, Advanced Functional Materials, European Physical Journal Special Topics, ACS Applied Materials and Interfaces, JACS, Science Advances and the Journal of Physical Chemistry Letters.
The average Hirsch-index of a YIN member is h = 15,3. Due to different publication traditions in the different disciplines, the h index of the YIN members varies significantly. In addition to publications, YIN members present their scientific work and also represent KIT at numerous occasions. In 2016, the 41 YIN members of this survey presented their work at 158 international conferences. Furthermore, 10 patent applications were filed by YIN members in 2016.

Distribution of Working Hours

At this stage of their careers, the time that young group leaders spend in their labs or writing papers diminishes as other activities take more and more time and precedence. As all YIN members have personnel responsibility, 23% of their time is taken by supervising and mentoring, 16% by teaching and 14% by grant writing. Since all YIN members are third party funded this last point is a very important part of their job. Furthermore, there are increasing administrative duties and committee work that they have to fulfill, which takes 20% of their time on average.

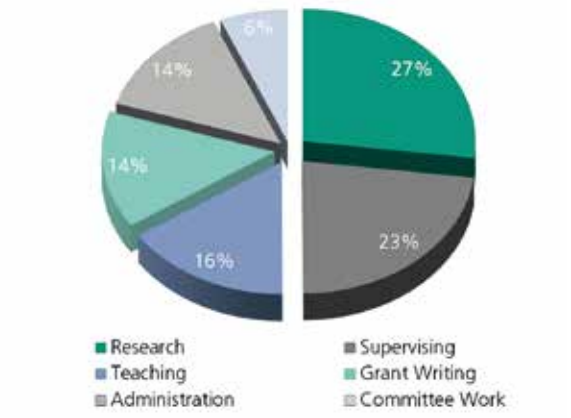


Fig 9: Distribution of working hours of junior group leaders with personnel responsibility

Interview with YIN speakers in LookKIT

Dr. Kathrin Valerius: "YIN is directly involved in higher education politics at KIT. We represent the interests of young investigators in structural processes like the Overarching KIT Strategy 2025, the Tenure Track Program or the application for the Excellence Strategy."

PD Dr. Achim Rettinger: "In Germany and also at KIT, the status of junior research group leader is still not very precise and not really standardized. The official guidelines allow room for interpretation - especially in regard to rights and duties - which each university, each KIT faculty and each institute reads and comprehends differently. The information situation is often lacking and doesn't cover all questions. As junior group leaders are generally not part of a KIT faculty, YIN is our only representation of interests."

ncomms: one step towards quantum simulators

Physicists at KIT have developed a crucial component for a quantum simulating. They represented the light-matter-interaction of photosynthesis using electromagnetic resonators for the photons and superconducting circuits as quantum bits for the atoms. "We succeeded in getting both the quantum bit and the resonator to assume two opposite states at the same time," says Dr. Martin Weides, co-author and YIN member. Due to this effect, quantum simulators solve a problem much faster than conventional computers which store information either as zero or one.

YIN article made into the Physics Journal and was presented at the Deutsche Physikerinnentagung

Opinionated and knowledgeable, YIN outlines the situation of junior scientists in the Physics Journal published by the German Physical Society (DPG). Based on numbers from the Federal Statistics Office, YIN takes a closer look at dwindling chances to obtain a permanent academic position and a decreasing demand for PhD holders from industry. Highly-skilled academics without clear career perspectives are not seldomly too old, one legged, or over educated to switch sides – women are hit harder: While, for example, 47 percent of all male scientists at German universities had a permanent contract in 2015, among their female colleagues it was only 35 percent. With 44 to 27 percent, the difference between the genders was even higher in physics.

YIN Day – Connect with Alumni

At the YIN Day 2016, members and alumni connected, celebrating the 9th anniversary of the network together. Starting deliciously with the workshop *Etiquette at Business Luncheons*, the day continued with news about YIN and an interactive poster session and was finally topped off with an inspiring talk given by Prof. Georg von Freymann. As a former YIN member and current professor of physics at the University of Kaiserslautern, Freymann reflected on his detouring efforts to become professor, gave insights into bizarre appointment procedures and offered advice on how to deal with setbacks. Inspired by the talk, curious YIN members could ask their questions during the closing get-together.

PLOS ONE and ex-*nature* editor at YIN fireside chat

Data availability, source code sharing and credit taxonomy for authors are essential in open access publishing. These requirements give rise to a whole set of new questions that vary for each discipline: What is the minimum data set and where to store it? How can specially programmed software tools be maintained sustainably over time? And which are the right criteria to weigh and describe each author's contribution? At a YIN Fireside Chat, Dr. Leonie Mück gave some answers as well as valid insider information on what it takes to publish in high end journals and how Open Access might shape the future of scientific publishing in general. Leonie Mück worked as senior editor for *nature* until August 2017 when she joined one of the first non-profit Open Access journal *PLOS ONE*. Her subject areas are physical sciences, especially mathematical physics, quantum mechanics, high-energy physics and atom optics.

KIT Faculty Teaching Award for YIN alumnus

For the lecture on material process technology, YIN alumnus Kay Weidenmann, together with Joachim Binder, receives the KIT Faculty Teaching Award in mechanical engineering. Therewith, KIT honors the excellent achievements of both lecturers: They especially attached importance to the close interconnection of theory and application. Thus, their lecture was complemented by practical courses in small groups at three laboratories. The prize, endowed with 10 000 Euro, is annually announced within each of the 11 KIT faculties.

European Research Council Grants

The European Research Council (ERC) provides funding opportunities for excellent researchers and their teams regardless of their nationality and current place of work. Germany's research landscape offers a wide range of outstanding host institutions in all scientific areas. The impressive number of German research institutions and universities hosting one or more of the distinguished ERC grants speaks for itself.

The ERC annually launches calls for proposals for several funding schemes:

Starting Grant:
open to researchers between 2 and 7 years after PhD with maximum funding of 2 million euro and a maximum period of funding of 5 years

Consolidator Grant:
open to researchers between 7 and 12 years after PhD with maximum funding of 2.75 million euro and a maximum period of funding of 5 years

Proof of concept:
for market analysis, technical tests and validation, clarification of the intellectual property rights position and strategy or the outline of a business plan with maximum funding of 150,000 € for a maximum period of 18 months (only for ERC grantees)

Advanced Grant:
open to established researchers with at least 10 years of significant research achievements with maximum funding of 3.5 million euro and a maximum period of funding of 5 years.

Synergy Grant:
for groups of 2 to 4 researchers and their teams up to 10 million euro for a maximum of 6 years

For an application you need an innovative idea for a research project at the frontiers of science, an excellent scientific track record (publications and other achievements) and a host institution in Europe which can be any research performing organization, i.e. universities, research organizations or private companies.

Projects of innovative and groundbreaking nature in all fields of research including Social Sciences and Humanities will be funded. There is no pre-defined thematic areas or topics. Scientific excellence of the project idea and the scientist is the sole criterion for project selection.

These criteria have been fulfilled by several YIN members. From the 14 ERC grant holders at KIT, nine are YIN members.

http://www.eubuero.de/erc.htm
https://erc.europa.eu/

ERC and YIN

YIN Members
KIT scientists who are not members of YIN

ERC STARTING GRANT

2017: **Dr. Cornelia Lee-Thedieck** (IFG-KIT)
"BloodANDbone – conjoined twins in health and disease: bone marrow analogs for hematological and musculoskeletal diseases"

2017: **Prof. Dr. Lars Pastewka**
(University of Freiburg since 2017)
"Emergence of Surface Roughness in Shaping, Finishing and Wear Processes (ShapingRoughness)"

2016: **Prof. Dr. Corinna Hoose** (IMK-TRO-KIT)
"Closure of the Cloud Phase (C2Phase)"

2013: **Prof. Dr. Erin Koos** (MVM-KIT)
(Univerity of Leuven since 2016)
"Capillary Suspensions: A Novel Route for Versatile, Cost Efficient and Environmentally Friendly Material Design (CapS)"

2013: **Dr. Pavel Levkin** (ITG-KIT)
"DropletMicroarrays: Ultra High-Throughput Screening of Cells in 3D Microenvironments (DropCellArray)"
2015 & 2017 Proof of Concept Grant each 150T€

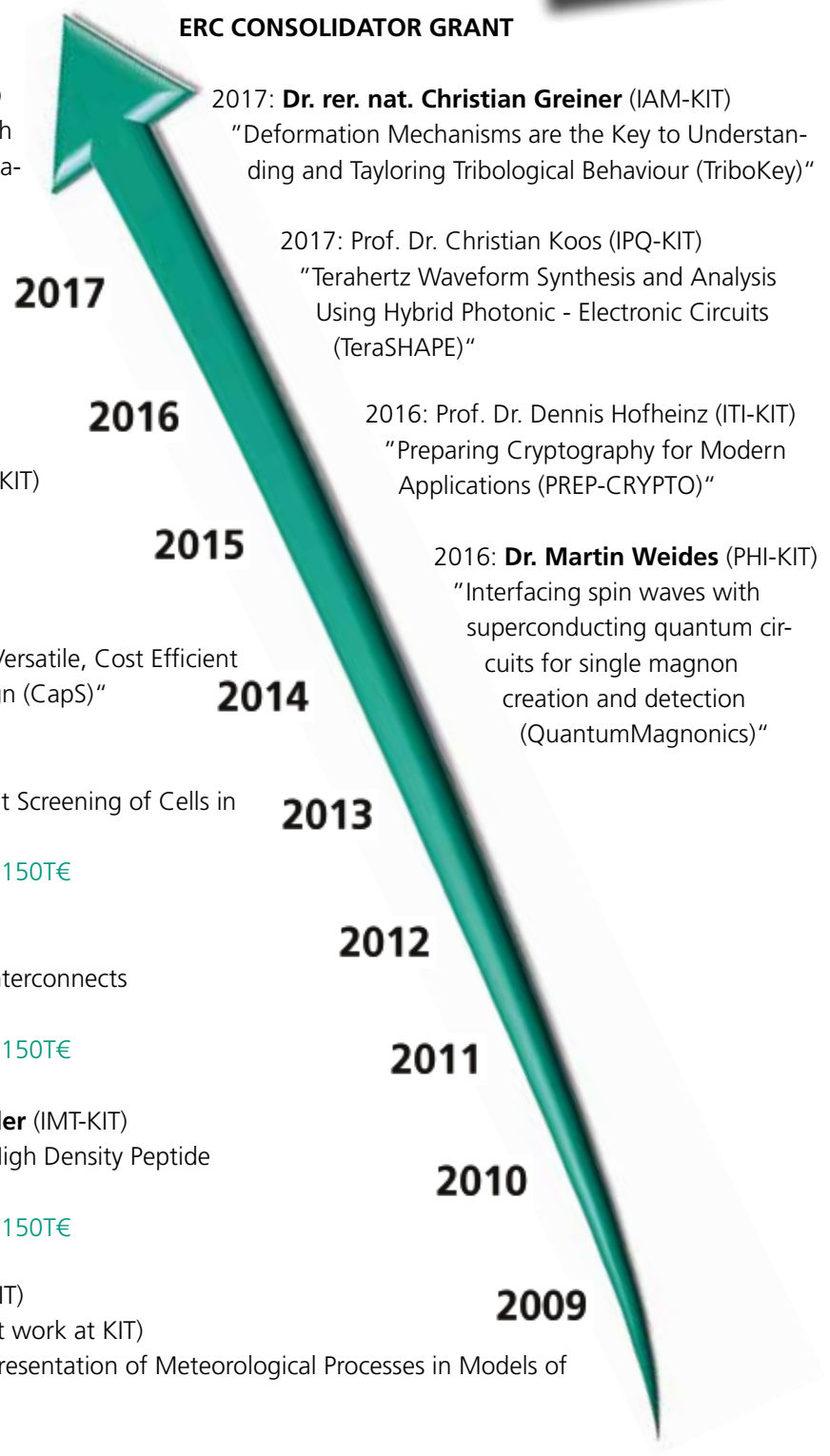
2011: Prof. Dr. Christian Koos (IPQ-KIT)
"Energy-Efficient Multi-Terabit/s Photonic Interconnects (EnTeraPIC)"
2015 & 2016 Proof of Concept Grant each 150T€

2011: **Prof. Dr. Alexander Nesterov-Müller** (IMT-KIT)
"Combinatorial Patterning of Particles for High Density Peptide Arrays (CombiPatterning)"
2015 & 2017 Proof of Concept Grant each 150T€

2010: Prof. Dr. Peter Knippertz (IMK-TRO-KIT)
(At the time of approval grantee did not yet work at KIT)
"Desert Storms - Towards an Improved Representation of Meteorological Processes in Models of Mineral Dust Emission (DESERTSTORMS)"

2010: Dr. Matthias Schneider (IMK-ASF-KIT)
"Multi-platform remote Sensing of Isotopologues for investigating the Cycle of Atmospheric water (MUSICA)"

2009: **Dr. Regina Hoffmann-Vogel** (PI-KIT)
"Structural and Electronic Properties of Nanoscale Metallic Contacts Fabricated by Thermally Assisted electromigration (NANOCONTACTS)"



ERC CONSOLIDATOR GRANT

2017: **Dr. rer. nat. Christian Greiner** (IAM-KIT)
"Deformation Mechanisms are the Key to Understanding and Tayloring Tribological Behaviour (TriboKey)"

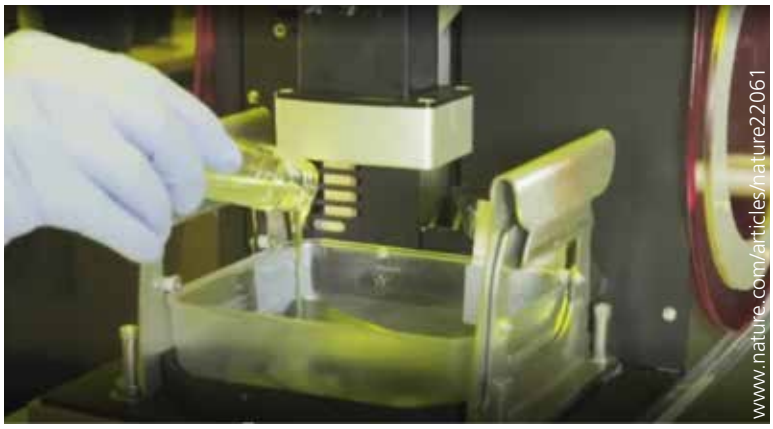
2017: Prof. Dr. Christian Koos (IPQ-KIT)
"Terahertz Waveform Synthesis and Analysis Using Hybrid Photonic - Electronic Circuits (TeraSHAPE)"

2016: Prof. Dr. Dennis Hofheinz (ITI-KIT)
"Preparing Cryptography for Modern Applications (PREP-CRYPTO)"

2016: **Dr. Martin Weides** (PHI-KIT)
"Interfacing spin waves with superconducting quantum circuits for single magnon creation and detection (QuantumMagnonics)"

Why publish in *nature*?

Three-dimensional printing in glass has become a reality. For the first time, Dr. Bastian Rapp and his BMBF-group created micrometer-sized glass components using a stereolithography 3D-printer. They developed a liquid silica nanocomposite that can be printed layer after layer and cured at specific points through light exposure. Residual liquid is washed out in a solvent bath. The polymer still present in the cured structure is subsequently removed by heating. The result is a non-porous, high-quality fused silica glass component with a smooth surface and a roughness of only a few nanometers. Thus, glass with its unmatched optical transparency and its outstanding mechanical, chemical, thermal and electrical resistance has finally become accessible to modern manufacturing. This opens up a manifold of new applications in production and research.



The technique uses a fine glass powder supended in a liquid.

Why publish in nature?
People from science read it, people from technology read it, people from industry read it – it has a huge audience and a really large traction in the public media. Publishing in such a journal gives you a lot of exposure and international visibility. It's a really big thing for promoting your science.

When did you start thinking about it?
When the first components came out of the process as transparent pieces of glass we knew this was the very first time that anyone has done 3D-printing in transparent silica glass. The lack of materials in 3D-printing has been repeatedly stated as one of the biggest obstacles for practical applications. Expanding this set of technologies to a new material would really be game changing for many industries and research communities.

Was the impact of your nature paper as exuberant as expected?
Definitely yes. ***nature*** has its own press department and they are connected to the really big news and media channels worldwide. They usually give out a press statement 24 hours before the embargo on the paper lifts. This means, immediately, when the paper goes live you will receive requests. I have given roughly 60 to 80 press interviews via skype, vie telephone, via email. This is definitely more media attention than you would usually obtain with a paper in a really good community journal that is highly cited. You can bet on the fact that once you publish with ***nature***, you'll spend two to three months in constant communication with the press – that goes over the weekends and well into the night if you talk to journalists from the USA, the West Coast or from Asia. I know from colleagues who have published more than one paper in such big journals that they are really careful about the time and energy they invest into answering each and every press inquiry.

You spend two to three months in constant communication with the press.

How about the impact among scientists?
It was equally huge. A lot of scientists have checked back asking us if we could produce a couple of parts or components for them and many wanted to know more about the specifics of the process. I have given some 25-30 invited presentations this year and fostered a number of new collaborations. The technology has been very quickly adopted and we can already see a lot of publications in proceeding papers using it. We have been very open about our work because firstly we want it to be usable by others. This gives you significance, citations, and a certain standing in the community. Secondly, we have filed a pattern on the core of the technology which we are at the moment commercializing and spinning off in a company.

PD Dr. Bastian Rapp

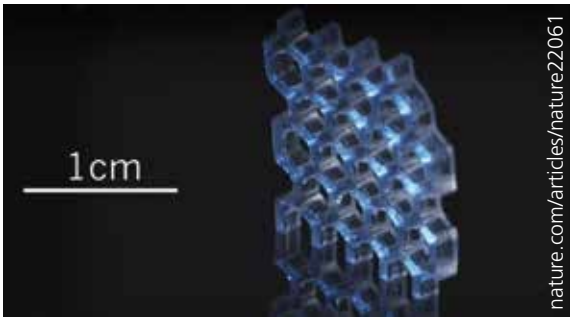
What if there isn't a product behind it?
Since April, this paper has already been cited 15 times. It will most likely make one of the top spots on my list of most cited papers in a couple of months which is really fast. Moreover, my scientific network has significantly expanded. Wherever you present a technology that has recently been published in ***nature*** people will listen up and are more likely to approach you afterwards. You get in contact with people from scientific communities you never even knew existed – literally speaking. Many are interested in using your technology, in applying it or developing it further with a new spin or twist. All of a sudden, you get invited to conferences that you would never have dreamed of attending as they seemed so far off from your core competences. We received a number of requests from the optics, telecommunication, and the photonics communities, for example. Glass is obviously one of the main materials for integrated optics in smart phones, high-speed data processing, or biotechnology.

Within just a few months, this paper will become one of my most cited.

Do you use another style writing for nature?
Definitely. Even though, they tell you to send the content in any form you have available, in reality the editors scan though dozens of manuscripts per day and if something fits the publication guidelines nicely, their tendency to pick it up is most likely higher. ***nature*** provides a very detailed template which you should stick to: Certain Information need to be summarized in the first sentence and the first paragraph, before you immediately go into the core findings. It's important to transmit your story in as few words as possible and as densely packed as possible while still being accessible. Once you pass the editorial and peer review, this is the second point you need to consider when publishing in big journals: To make it readable for a wider audience, the copy editor may make additional changes to your manuscript. A lot of technical terminology that is actually pretty well established in the community needs to be transcribed. They'll send you back a heavily edited pdf stating all the modifications that they like to implement, all the terms you need to reword, and all formulations you need to adapt. Basically, the main core of ***nature*** papers contains very little technical detail: just the information the reader needs to understand what you have done, roughly how you have done it, and why this is important. Everything else is squeezed into the supplementary online material which in many cases significantly exceeds the original paper in length.

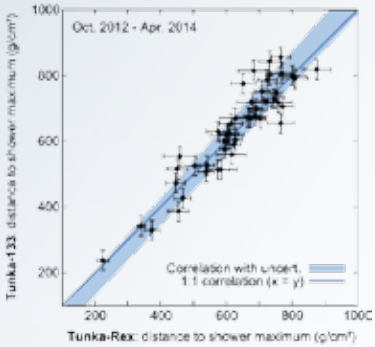
Is a paper in nature the key to every door?
No, it won't change everything. Some people told me that once you have a paper in such a journal you'll never have any grants rejected, get every paper published, will be offered dozens of professorship positions and so on. In my personal opinion it really is significantly less dramatic. I would advise anyone who tries to publish in such a journal to make a cut-off-benefit analysis. Give it a reasonable amount of work but don't overwork it. I know people that have spent months, over-preparing everything beforehand and, then, desperately battling and re-battling editorial and peer rejects. This is simply not worth the hustle. If it takes too much time and effort to get past the editor and peer review, don't try to over-fight it. Journals like ***nature*** publish a very small selection of papers. The ones they reject are not bad papers and they even miss super relevant stuff on the way. I think there is a huge component of chance involved. If your paper is rejected just send it on to another journal. Especially, if the rejecting editor took the effort to send some personal lines, you may be assured you are on to something.

neptunlab.org



The precision is only limited by the accuracy of the printer.

IUPAP Young Scientist Prize in Astroparticle Physics



Dr. Frank Schröder received the IUPAP Young Scientist Prize in Astroparticle Physics. The International Union of Pure and Applied Physics IUPAP, therewith, honored his outstanding scientific contributions: With the Tunka-Rex antenna array, Frank Schröder, experimentally confirmed the precision of radio measurements of cosmic-ray air showers. The radio measurements of his experiment correlate strongly with those by the established technique using air-Cherenkov light. While light observations, however, are limited to clear, moonless nights, radio emissions can be measured around-the-clock.

Cosmic rays at ultra-high energies of more than 10^{15} eV are too rare to be measured directly in sufficient quantity. When colliding with the Earth's atmosphere, however, they set free cascades of secondary particles and, thereby, produce light as well as radio waves. Thus, the intensity of the light or radio signals permits to indirectly estimate the energy of the primary particle. The longitudinal shower development indicates the type of the primary particle: Heavy nuclei on average interact earlier in the atmosphere than light particles such as protons. Measurements of the atmospheric depth of the shower maximum, therefore, allow to statistically deduce the mass composition of the primary particles.

The established method of Cherenkov-light detection is known for its high precision. The particles in the air showers are faster than the speed of light in air: they have a speed in between the light speed of air and vacuum, where the latter is the maximum speed allowed by the theory of special relativity. Similar to the bang of a supersonic jet, the air-shower particles emit a flash of faint blue and ultraviolet light that is only detectable in dark and clear nights. As advantage over Cherenkov-light detection, radio antennas work around the clock and, moreover, are substantially more economic. However, their performance had to be tested by a direct experimental comparison against an established technique, which was done by Tunka-Rex, a 1 km² large antenna array close to Lake Baikal in Siberia.

The energy precision of Tunka-Rex is already competitive. Further optimizing the calibration will increase the scale accuracy of the energy to the level currently achieved with the leading techniques of light detection. Tunka-Rex provided a direct experimental proof that the shower maximum can be measured with radio antennas. Tough, the resolution can be further improved by employing better analysis methods and by using additional antennas.

High accuracy in this energy range makes it possible to better study the transition from galactic to extra-galactic cosmic-ray sources of even higher energy, whose origin is still unknown. Here, Tunka-Rex will provide additional statistics exactly where current air-Cherenkov analyses are limited due to restricted measurement time. Moreover, hybrid measurements of air-showers by Tunka-Rex and the muon detector Tunka-Grande will enhance the total accuracy for the mass composition as a function of energy by combining radio and muon measurements.

www.ikp.kit.edu/tunka-rex

Radio detection of ultra-high-energy cosmic rays and neutrinos, F. G. Schröder, Prog. Part. Nucl. Phys. 93 (2017)
Radio measurements of the energy and depth of maximum of cosmic-ray air showers by Tunka-Rex
Tunka-Rex Collaboration, JCAP 01 (2016) 052

YIN Lecture Series continues

World leading researchers attract and strengthen the scientific community at KIT across disciplines, generations, and institutions. They inspire young researchers, enable discussion about current research trends, and encourage collaboration across disciplines. In 2017, YIN has hosted another two lectures with very prominent speakers.

YIN Lecture No. 5 with Jean-Marie Lehn
Supramolecular chemistry is actively exploring systems undergoing self-organization. In regard of the lability of the interactions connecting the molecular components of a supramolecular entity and the resulting ability of supramolecular species to exchange their components, supramolecular chemistry is intrinsically dynamic. The same holds for molecular chemistry when the molecular entity contains covalent bonds that may form and break reversibility, so as to allow a continuous change in constitution by reorganization and exchange of building blocks.

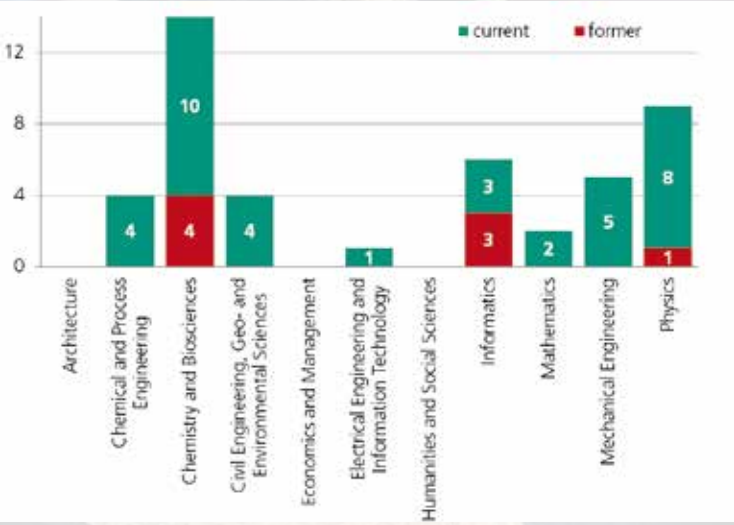
These features define Constitutional Dynamic Chemistry (CDC) which introduces a paradigm shift with respect to constitutionally static chemistry. Dynamic diversity allows variation and selection. Dynamic constitutional diversity responds to either internal or external factors to achieve adaptation. Thus, CDC generates networks of dynamically interconverting constituents, constitutional dynamic networks, presenting agonistic and antagonistic relationships between their constituents.

The implementation of these concepts points to the emergence of adaptive and evolutive chemistry, towards a chemistry of complex matter.

YIN Lecture No. 6
with Guinevere Kauffmann
Black holes of more than a million solar masses form the centers of many spiral galaxies. One example is the Earth's home galaxy, the Milky Way. In the 6th YIN Lecture, Prof. Guinevere Kauffmann, a director at the Max Planck Institute for Astrophysics talked about the observable evidence for the existence of such supermassive black holes. At those sites of extreme gravity, in-falling matter is efficiently converted into radiation visible across the electromagnetic spectrum. Large surveys of galaxies across the Universe suggest that black holes not only swallow large quantities of matter but also dump energy into their host galaxies and regulate their growth since the big bang until today.

Confirmed for 2018
YIN Lecture No 6 with Nobel Laureate Prof. Jean-Pierre Sauvage (Chemistry 2016)

Associate Fellows at three more KIT faculties



Number of current (green) and former (red) KIT Associate Fellows per KIT Department. (Data from KIT Departments in November 2017)

In 2017, three additional KIT Departments ascribed the status of a KIT Associate Fellow to independent junior research group leaders:

- the KIT Department of Mathematics,
- the KIT Department of Electrical Engineering and Information Technology,
- the KIT Department of Chemical and Process Engineering.

The latter had only appointed senior scientists before. Thus, by now, 8 of the 11 KIT departments granted the right to teach, to supervise PhD students and to take part in the corresponding examination procedures to young group leaders.

Presidential Committee
Vice President for Higher Education and Academic Affairs
Prof. Dr. Alexander Wanner

The status and award "KIT Associate Fellow" is becoming more and more accepted throughout KIT's departments. That is a most welcome development, as the "KIT Associate Fellow" status supports especially excellent young scientists by putting full advisor responsibilities on them in early stages of their academic careers.

The KIT Associate Fellow is certainly a great opportunity for many junior group leaders and allows to gain experience in independent teaching, supervising and examination procedures. For postdocs who carry budget and staff responsibility for the first time, these are the next sensible qualities to attain on their career pathway towards scientific leadership.

Especially for the leaders of larger, well-funded groups, the status might not always be fully satisfactory. The Helmholtz Association, for example, explicitly asks for the right to award doctorates to be assigned to their Young Investigator Group leaders (cf. template for the joint statement with the partner university). While at other departments, they can be first reviewer for their PhD students, at KIT, they are only allowed to serve as an additional third reviewer. Such an additional third review is certainly a good experience for young group leaders, though of little practical relevance eventually, as it appears basically as an "add-on". Also, the need for asking professors to supervise the Master students working with these young group leaders is somehow limiting the responsibility for the own group to the (post)doctoral level at this point.

while three are still lacking Associate Fellows

The KIT Associate Fellow status is an important instrument to promote the structural and scientific recognition of junior group leaders. Still, there are three KIT departments without an Associate Fellow yet - though not necessarily due to the lack of qualified young group leaders. To encourage dialog and learn more about the reasons, YIN asked the deans abouts its reason. From the KIT Department of Architecture, we received a very forthcoming and interesting response.

KIT Department of Architecture
KIT Vice Dean Prof. Dipl.-Ing. Anderas Wagner

There are probably three main reasons for the lack of Associate Fellows at the KIT Faculty of Architecture:

1. Compared to other KIT faculties or scientific disciplines, academic careers in Architecture are less prominent as most of the graduates decide to work as practicing architects where a PhD degree is normally not needed.
2. Most of those doing a PhD will leave academia afterwards, again for a career as practitioners.
3. Postdocs in Architecture remaining at the university mainly do their research individually or in small groups which do not match the criteria of DFG Emmy Noether, HGF-Nachwuchsgruppe, or ERC Starting Grant.

The KIT Faculty of Architecture has to increase efforts to promote independent academic careers at postdoc level and to motivate scientists to build up their own research groups by the funding instruments mentioned above (or others). The KIT faculty started a program for PhD candidates, which includes biannual workshops and colloquia as well as continuous support by a mentor. Within the workshops, general aspects of doing research, applying for funding etc., are discussed. The workshops and the individual consultancy by the mentor could be used to promote the KIT Associate Fellow and to encourage suitable researchers to go this way more systematically. Advantages of leading an own research group and perspectives for academic careers have to be emphasized in a convincing way and the KIT faculty should discuss whether incentives could be offered for writing proposals that yield larger research groups.

If the research topic of the person and her/his group fits into the working frame of the KIT faculty and the group wouldn't need resources which the KIT faculty could not provide, we don't see a reason for not integrating this group into the KIT faculty and ascribe the status of KIT Associate Fellow to the group leader. Nevertheless, it would be preferable to develop research groups and KIT Associate Fellows out of the KIT faculty's own PhD and postdoc program.

KIT Associate Fellows...
...LEAD independent research groups with at least two postgraduates
...SUPERVISE their PhD students
...MAY be thesis reviewer and/or examiner of their students
...HOLD PhD for 2+ years prior
...DO NOT have a habilitation (yet).

Continually towards Leadership Excellence

Personal Coaching
by Dr. Kathrin Valerius
Helmholtz Young Investigator Group at the Institute for Nuclear Physics

My first contact with personal coaching in YIN took place during an informal "test coaching" following one of the regular interim reviews. I appreciated the opportunity to pick up a few of the topics that had just come up in the peer counseling round with a professional coach, and we ended up putting together an outline of topics for a continued coaching relationship. We had a series of sessions separated by intervals of 2-3 months, typically, to take regular snapshot impressions reflecting my personal development and also the frequent and sometimes deep-reaching developments of my professional environment, which in general are characteristic for the career of a junior group leader. This monitoring was aided by my coach coming to visit me at my workplace for one of the sessions, to get an impression of my professional surroundings and the way I interact with them.

My experience with discussing personal career goals and mechanisms to cope with various typical stressors was very positive. In particular, I got practical advice on the concepts of mindfulness-based stress reduction (MBSR), which my coach helped to implement in my daily routine. For me, thus, the personal coaching offered through YIN forms an ideal supplement to the continued education program organized as group workshops and to the peer counsel during the interim reviews.

workshop *From the Application to the Appointment Procedure*
by Dr. Dominic Bresser , Vector Foundation
and Dr. Ulrich W. Paetzold, Helmholtz Young Investigator Group

Young group leaders are at an exciting, but critical stage in their career. They have established successful, independent research groups, but next face an application process for appointment as professor which is in some ways mysterious and certainly different from all previous career steps. Therefore, the workshop *From the 'Application to the Appointment Procedure'* provides insightful and hands-on information.

We started off with an overview on the entire process, ranging from the careful preparation of application documents, over the job talk and the interview, to the negotiation itself. In regard of the application, especially the potential requirement of including a teaching plan was intensively discussed – presumably, as young group leaders are usually dealing less often with this. Moreover, we were made aware to that particular care has to be taken, if there is already a well-defined teaching concept and the curriculum in place. This part was finally closed with a check of the present application documents of the participants, critically discussing how to further improve them – not least in consideration of the guidelines and recommendations discussed earlier. Since the job talk is rather topic specific, the focus of the next part was on the subsequent discussion and interview, including some practice on how to reply best to critical comments concerning the CV. In fact, it turned out that the applicant himself is frequently far more critical than others. On the second day, we focused on the negotiation subsequent to a successful application. The general rules, steps, and time lines were presented and we were exposed to different negotiation strategies and made aware of any "No Go".

All attendees found this workshop exceptionally helpful. It is not only a great support for those who have already started to apply for a professorship, but also for those who are just preparing for the next career step. The hands-on experiences and insightful information covered different backgrounds, "No Gos", mind setting, and inspiration about what to further focus on for the own career.

The **YIN Certificate Academic Leadership** was awarded to
YIN member **Dr. Cornelia Lee-Thedieck** and
YIN alumnus **Prof. Henning Meyerhenke**.
After many seminars, workshops and coachings – mounting up to 200 academic units – they have proven themselves as exceptional leader personalities.

Navigating through the „rush hour of life“[1]

Karin Funk
Manager of YIN continuing education program

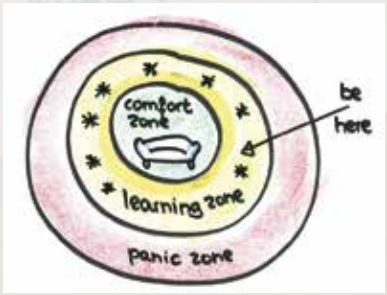
Sociologists have named the years between 30 and 40 the “rush hour of life.” This is the phase when everything must come together: building a house, starting a family, making headway in one’s career. Young group leaders and junior professors are right in the middle of this phase. What does that mean for them in particular, and how can they master the associated challenges with vigor?

After completing their PhD and stints as postdocs, all YIN members have successfully applied for their own grant money and are now leading a research group for which they have supervisory responsibilities. Unlike earlier YIN generations, most have already committed themselves to the long-term responsibility of starting a family with a partner likewise employed and one, two, or even more children. Another thing they all have in common, however, is a limited employment contract meaning long-term professional uncertainty.

How do you successfully maneuver through this demanding phase? Psychologists count on resilience: the ability to adapt well to difficult challenges and stressful situations and even to turn them into a springboard for personal development.[2]

For years, resilience was considered to be a relatively unchangeable aspect of an individual’s personality. More recent studies, however, have revealed a different picture: resilience can in fact be acquired and enhanced! Developing resilience is about investing oneself in a dynamic self-management process whose rewards are paid out in perpetuity and which can be initiated or accelerated at any time. Here, along with an unsurprising improvement in their subjective sense of well-being, research leaders also stand to profit in another important way: In today’s digitized, highly-networked workplace, one characterized by volatility, uncertainty, complexity, and ambiguity, it is only logical that leaders who possess outstanding resilience will also be more likely to rise to the top and outlast the competition.

To learn something new, we must step out of our comfort zone and experiment with previously unfamiliar modes of behavior. This step takes a bit of courage, of course, but it pays off with the possibility of personal and professional growth. New behaviors are tried out, refined, and eventually integrated into an expanding repertoire, thus promoting flexibility and increasing options. Just as the immune system requires real infectious agents to trigger the development of its defenses, personal growth also requires real challenges to trigger the development of resilience.[4] The ultimate question is not whether we have gained insight, but whether we can use our insight to fuel useful changes in behavior.



The members of YIN have already mastered an extensive series of challenges and, as a result, have long since begun to enhance their resilience. I would like to encourage them all to consciously use the demanding “rush hour of life" to re-invigorate their endeavors, to take appropriately-sized steps outside their comfort zone, and integrate the resulting insights into their everyday lives. There might even lurk some undiscovered insights in a blind spot, which might be made visible and even profitable with the help of a coach.

I would be happy to serve as a sounding board for all YIN members who wish to take their own personal “resilience inventory”. In addition, I can describe the Network resources available to support you in moving ahead from here to expand your repertoire of skillful responses and better meet the challenges inherent to research leadership.

[1] Bertram, Hans: „7. Familienbericht des Bundes“ (2006).
[2] Cf. Heller, Jutta: „Mit Resilienz-Coaching allen Stürmen trotzen“. In: Wirtschaft & Weiterbildung, 01/2017. p. 38.
[3] Recommended within the 10-point program for developing resilience by the American Psychological Association.
4 Lieb, Klaus: *Resilienz lässt sich trainieren*. Spektrum der Wissenschaft 11/2017, p. 19.

New Members

Dr. Hartwig Anzt
Institute Steinbuch Centre for Computing

Helmholtz-Young Investigator Group
Mathematics, Numerical linear algebra, Computer Science, High Performance Computing

Dr. Dominic Bresser
Helmholz Institute Ulm

Research Group VECTOR foundation
New Electrode Materials for Rechargeable Electrochemical Energy Storage Devices

Dr. Sebastian Höfener
Institute of Physical Chemistry

KIT-Junior Research Group
Molecular electronic-structure methods in complex environments

Dr. Ing. M. Azad Emin
Institute of Process Engineering in Life Sciences

KIT-Junior Research Group
Extrusion of biopolymeric materials

Dr. Philipp Niemann
Institute for German Studies

KIT-Junior Research Group
Science in Presentations

Dr. Zbigniew Pianowski
Institute of Organic Chemistry

DFG Researchh Group
Chemical biology, supramolecular systems and prebiotic chemistry

Dr. rer. nat. Aiko Voigt
Institute of Meteorology and Climate Research

BMBF Research Group
CONSTRAin: Cloud-radiative interactions with the North Atlantic Storm Track

Dr. Ing. Karsten Woll
Institute for Applied Materials

DFG Emmy-Noether Group
Pulsed Metallurgy on Metallic Thin Films

Prof. Dr. André Butz
Head of Department
German Aerospace Center
Professor at Meterological Institute at LMU Munich

previous:
DFG Emmy-Noether Group
Remote Sensing of Greenhouse Gases for Carbon Cycle Modelling

Prof. Dr.
Jian-Jia Chen
Professor for Informatics
Technical University Dortmund

previous:
Junior-Professor
Timing analyses and safety guarantees

Prof. Dr. Henning Meyerhenke
Professor of Computer Science
University of Cologne

previous:
Juniorprofessor
Parallel and Distributed Computing

Dr. Felix Löffler
Group Leader
Max Planck Institute of Colloids and Interfaces

previous:
Carl Zeiss Grant
Microarray Technology and Antibody Profiling

Dr. Jörg Overhage
Associate Professor in Health Sciences
Carleton University

previous:
KIT Junior Research Group
Molecular Microbiology and Infectious Disease

Prof. Dr.-Ing.
Stefanie Speidel
Professor for Translational Surgical Oncology
National Center for Tumor Diseases

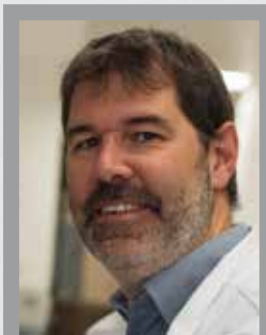
previous:
Margarete von Wrangell
Situation-adapted assistance system for minimally invasive surgery

Dr. Julia Syurik
Project Engineer for cable protection systems
Flexa GmbH

previous:
Helmholtz-Young Investigator Group
Cold-Atom Scanning Probe Microscopy, Functional Polymer Composites, Biomimetics

Prof. Dr.
Lars Pastewka
Professor of Simulation in Microsystems Engineering
University of Freiburg

previous:
DFG-Emmy-Noether Group
Towards a Correlation of Friction and Wear in Amorphous Materials



Assoc. Prof.
Steffen Scholpp
Associate Professor for Cell and Developmental Biology
University of Exeter

previous:
DFG-Emmy-Noether Group
cell and developmental biology

Visualizing complex relations in distributional analyses

Dr. Andreas Haupt
Sociology

The journalist Tilo Jung asked the (as to this date) Secretary of Social Affairs Andrea Nahles (SPD), whether she would double the unemployment subsidies ("Hartz 4"), if she had the power for it. Andrea Nahles disagreed with this idea, because "to double the Hartz 4 subsidies would mean to double the poverty rate – sounds crazy but it's a fact". However, this statement is not true. Within our project, we developed various tools for easy comprehensive visualizations for allowing the scientific community and the public alike to investigate such claims.

Andrea Nahles' problematic claim has its roots in the very complex nature of distributions of subpopulations to the entire distribution as well as the construction of the poverty rate. To analyze the relevance of households with income from Hartz 4 for the poverty rate, we would need to know, where such households are located within the entire distribution and how influential they are for different parts of the distribution. This is important, because the official poverty rate is a function of the median (60% of its value) and the poverty rate is the share of all households falling below the poverty line. If an increase of Hartz 4 subsidies for 200% would actually increase the poverty rate, the affected households would need to rise the median considerably but should not push up the lower tail of the distribution.

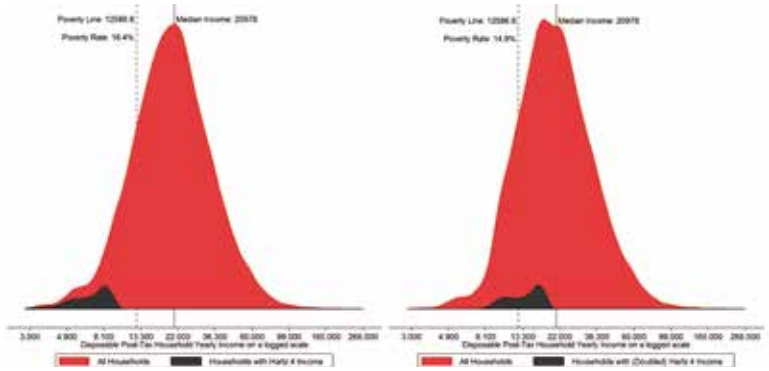


Figure 1: Income distributions of all German households in 2015 and of households with Hartz 4 income (left) as well as the same households with doubled Hartz 4 income (right). Data: SOEP V32. Own calculations.

Figure 1 shows the opposite effect. The relative poverty rate in 2015 was 16.4% with a poverty line of about 12.600 Euro per year (for a single household). Hartz 4 households locate clearly below that line. We also see that they are only one group out of many within the low-income ranges. Pensioners, unemployed without receiving subsidies, apprentices, and low wage households are also located there.

The right hand side of the figure shows the same data with doubled Hartz 4 incomes. Even a doubling would not influence the median income. These households are only shifted within the lower half of the distribution, which does not change the median at all (because it is a separator for the upper and lower half). Consequently, the poverty line is also not affected. However, the income boost for Hartz 4 households would push a lot of them out of the lower tail, compressing the lower half and reducing the poverty rate to 14.9%.

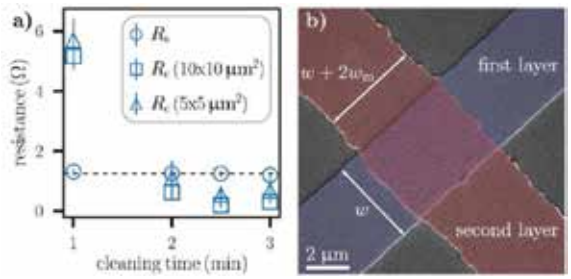
JProf. Boris Neubert
Informatics

This is only one out of many applications for the visualization tools we propose. From a technical view, we utilize Bokeh, a Python library that allows us to visualize data and embed the resulting visualization into a HTML file. Furthermore, with Bokeh, we can add user interactivity by linking web page widgets to JavaScript code, which enables the manipulation of the visualization's data sources. Thus, we shift most of the necessary computation on the client side, thereby, reducing heavy server load. The resulting web pages run in any modern browser that supports JavaScript and allow the user to individually explore and understand the visualized context. In a next step, we plan to test the applicability of our tools using randomized user experiments.

Integration of electron-beam and optical lithography, for the development of quantum coherent electronics

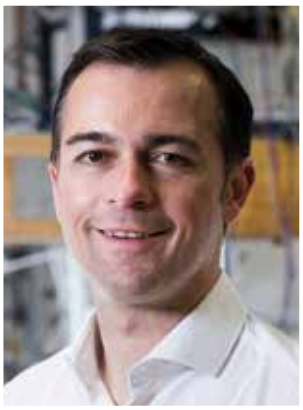
Dr. Ioan Pop
Physics

As the functionalities of proof-of-principle quantum superconducting circuits are becoming ever more sophisticated, their integration into larger devices, with complex layouts, has become a milestone for the community. Given the vast experience of the semiconductor industry, one could assume that the task of connecting microelectronic lithographic structures is a completely solved problem. However, when dealing with quantum coherent circuits the challenge is quite serious: In contrast to CMOS, where one only needs to worry about galvanic contacts, quantum circuits also need to remain quantum coherent.



(a) Measured DC contact resistance Rc at room temperature as a function of cleaning time for 5×5 and 10×10 µm2 overlaps. (b) False colored SEM image of a contact area after 3 min of cleaning and deposition of the second aluminum layer. The second (red) layer shows rough edges due to the aggressive cleaning step performed prior to metal deposition, and a widening of the strip by 2wm.

At the end of this project, we are happy to report that the main objectives were successfully achieved. We implemented and tested the fabrication of quantum coherent contacts between different lithographic layers. We tested these contacts by integrating them in superconducting microwave resonators, and we measured no degradation compared to state-of-the-art coherence. Therefore, we believe our results are directly applicable to current superconducting qubit and resonator designs, allowing a significant increase in their complexity. Our results will also enable to interface superconducting circuits with other mesoscopic quantum systems, such as semiconducting structures or topological insulators, without losing quantum coherence.



Dr. Martin Weides
Physics

To test the contacting procedure, we decided to use two optical lithography steps. The resulting contacts and the contact resistance are shown in the figure. The procedure was validated by the measurement of state-of-the-art levels of coherence in quantum resonators fabricated using this method. The method is currently being used in our groups for complex circuit designs. These results have been published in *Applied Physics Letters* a top-tier peer review journal.

L. Grunhaupt et al., Appl. Phys. Lett. 111, 072601 (2017), „An argon ion beam milling process for native AlOx layers enabling coherent superconducting contacts“, http://aip.scitation.org/doi/10.1063/1.4990491
Online open access: https://arxiv.org/abs/1706.06424

YIN Grants 2017

Experimental test of high-energy water release model applied to adsorption of guest molecules within functional materials
Dr. Manuel Tsotsalas and Dr. Frank Biedermann

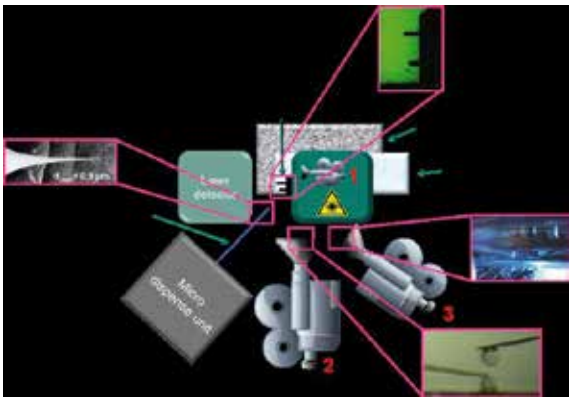
Sustainability aware Enterprise Information Systems Modeling and Analysis
Dr. Stefanie Betz and JProf. Anne Koziolek

Nanoscale Biofunctionalization of Polymer Brushes by Dip-Pen Nanolithography
Dr. *Guillaume Delaittre and Dr. Dr. Michael Hirtz*

AFM measurements of capillary forces between micro particles in gases and liquids

Prof. Erin Koos
Material Science

Capillary suspensions can be used to make macroporous materials with a very high mechanical strength and wide range of applications such as filtration membranes, high surface electrodes or medical implants. For these applications, precise control over porosity and strength of the porous material is a key engineering task. The rheological properties of a particle suspension can be significantly altered by adding a small amount of a secondary fluid that is immiscible with the bulk phase.[1] The changes in the strength arise due to the capillary forces between micron-sized particles leading to a percolating particle network which can be used as a precursor for porous materials. In order to control the final material properties, we must better understand the strength and failure of the direct particle contacts. This project aims to measure the interaction force between micron-sized glass or polymer particles connected by monomer bridges in a fluid environment using colloidal probe atomic force microscopy (CP-AFM).



Experimental set-up including the AFM probe (1) and two cameras to image the bridges (2) and align the particles (3).

Before polymerization, the force will depend on the interfacial tension, contact angle, relative size of the bridge, and separation distance. The contact angle hysteresis, the difference between the advancing and receding contact angles, can differ and will affect the network structure formed during initial mixing as well as the suspension strength upon subsequent deformation.

Dr. Julia Syurik
Physics

After polymerization, the adhesive or cohesive force between the bridge and particle will affect the strength of the porous body. Using CP-AFM, we can measure the elastic modulus as well as the yield and fracture strengths. We can also determine the failure mode (e.g. cohesive failure at the bridge neck or adhesive failure of the bridge-particle interface) by imaging the sample during or following the measurement. Experiments can be conducted either in air or in a liquid at controlled temperatures.

As this experimental set-up to conduct CP-AFM experiments in a heated, liquid environment is novel, the first paper (in progress) will include a detailed description of the instrumentation. It will also include measurements of capillary force measurements in air and in liquid and force measurements during and after polymerization of the capillary bridges.

[1] Koos, E. Current Opinion in Colloid and Interface Science, 19(6), 575-584 (2014).
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What we stand for

YIN connects independent junior research group leaders and junior professors on an early stage of their scientific careers. As in 2008, when YIN was initiated, we, the members, still occupy a very critical career niche between postdocs and tenured professors. As YIN, we speak with a single voice and our voice is heard. For example, YIN representatives are involved in the shaping of the upcoming Overarching KIT 2025 strategy, which aims to bring clearness into career perspectives of young scientists besides other issues. The continued existence of YIN is a testament to the role it plays within the academical hierarchy and to the services it provides for members. Our mission, comprised of the following three statements, has and will continue to guide YIN.

Dr. Achim Rettinger
Representative

Dr. Kathrin Valerius
Representative

We encourage each YIN member to become a better group leader. YIN members can take part in continuing education courses tailored to the needs of young group leaders in cooperation with PEBA. These courses include topics such as developing leadership abilities, improving research and teaching performance, as well as personal coaching. Rather than a static offering of courses, our members suggest and vote on desired themes to ensure that these courses directly meet their needs.

Dr. Frank Schröder
Alumni

We represent the interests of independent young investigators at KIT. Young group leaders and untenured junior professors face an uncertain future given the changes in higher education politics, the academic landscape and leadership priorities at KIT. YIN represents our interests by working with and persuading the administration to best define our official standing, the supervision of doctoral students, and other rights and responsibilities. YIN has also hosted discussions with representatives from politics and various funding sources to understand and shape the policies affecting our members.

Dr. Manuel Hinterstein
Finance

YIN strives to make KIT an ideal place for young scientists. YIN helps its members thrive in their research pursuits by encouraging collaborative discussions and projects. Interdisciplinary proposal coordination meetings help to bring members of related disciplines together to share their respective expertise and resources. YIN Grants provide a further incentive to pursue these collaborative projects. In addition, YIN has invited leading scientists to speak to YIN members directly and to an open audience as part of the YIN Lecture Series. The network also maintains connections to alumni and contacts with industry to exchange ideas and can discuss research opportunities.

JProf. Boris Neubert
Transdisciplinary

While our three mission statements have remained relatively unchanged throughout the years, our interpretation has evolved in response to member interests. We sincerely hope that YIN will continue to help our members grow, prove their independence and receive recognition in their respective fields. We also want KIT to remain an attractive place for young investigators. These goals require the active participation of our members and the support of the KIT community. To that end, this newsletter has been prepared to provide you with an update on our members and activities.

Dr. Stefanie Betz
Public Relations

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Karlsruhe, January 2018

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