



KIT – SCIENCE FOR IMPACT



Karlsruhe Institute of Technology

The University in the Helmholtz Association

FOREWORD OF THE PRESIDENT



With passion, curiosity, creativity, and freedom, while firmly rooted in social responsibility, we contribute to the shaping of a sustainable and resilient future. The urgent challenges of our time – climate change, energy transition, sustainable use of natural resources, digitalization and artificial intelligence, security and sovereignty, and an aging population – demand bold solutions that science and society must develop in a close partnership. These challenges inspire to push us all forward, driving fundamental change in our world, and at KIT. We are in a unique position to drive this transformation, as KIT unites curiosity-driven and mission-driven research under one roof – enabling the transition of scientific excellence into Science for Impact.

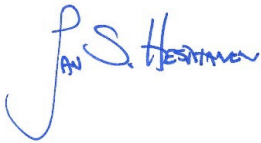
Scientific progress thrives on openness, exchange, and mutual respect. At KIT, over 120 nationalities come together to research, teach, work, study, and live. Without a global mindset and deep respect for one another, neither progress nor social cohesion is possible. We therefore nurture an international, interdisciplinary and inclusive culture. Our success is based on providing opportunities and by connecting talent, expertise, and ideas across learning, research, innovation, and administration. Through collaboration, global partnerships and modern project-oriented learning we ensure that theory meets practice, and that knowledge translates into solutions. This commitment is reinforced through structural, organizational, and individual initiatives that drive sustainable progress and collective success at KIT, supported by a central administration characterized by service and operational efficiency.

As an inclusive community, the importance of different perspectives to fuel growth, break down barriers, and build cultural understanding is woven into the fabric of KIT. Democracy, dialog, internationality and diversity are not simply politics, but deeply rooted values that influence and enrich everything we do. We embody an open and welcoming environment where national and international talent feels valued, supported, and empowered to succeed. Sustainability is embedded in our research, education, transfer activities, and campus life, and operations. We take responsibility for balancing technological progress with environmental and social awareness, embedding ethical considerations into our work to create solutions that benefit future generations.

Societal acceptance is key to sustainable progress. We engage stakeholders in co-creation, ensuring that technological advancements align with ethical principles and real-world needs. We foster trust through an active and open dialog with diverse stakeholders, including communities, policymakers, and industry leaders. Together, we create resilient solutions with lasting impact.

At the heart of KIT are the people. From students and young researchers to dedicated employees, senior scientists, alumni, and committed friends – our greatest resource is the vibrant KIT community. Their passion, enthusiasm, and dedication drive science and innovation, shape the future, and make KIT the place it is – the best place for the best people with the best ideas.

Together, we pledge that KIT remains a driving force in global education, research, and innovation – today and in the future.

A handwritten signature in blue ink, reading "Jan S. Hesthaven". The signature is stylized, with a large, looping initial "J" and a clear, legible name.

Professor Dr. Jan S. Hesthaven
President of KIT





SHAPING TOMORROW

KIT is a pioneering endeavor – it is in our very nature to take on a discovering role, to question the status quo, to embrace the unknown and to have the courage to actively shape tomorrow.

In an era of rapid technological, social, and environmental transformation, KIT is a beacon for navigating complexity through resilient and sustainable solutions. By integrating science, society, and education, we empower individuals, contribute innovative solutions, and lay the foundation for an evidence-based future.

As The University in the Helmholtz Association, KIT seamlessly integrates inspired teaching, groundbreaking fundamental research, and application-driven scale-up and innovation. At KIT, enthusiasm and curiosity fuels discovery, large-scale research enriches education, and collaboration drives progress in research and education. With a world-class infrastructure and a future-oriented environment, KIT empowers students, scientists, and innovators to pursue inter- and transdisciplinary research and development and to push the boundaries of knowledge.

As one of Europe's largest and most prestigious institutes of science and technology, and the only German University that includes national large-scale research facilities, we combine the depth of a technical university with the Helmholtz mission of addressing global challenges to ensure a transformative impact.

At our core, we believe that knowledge and participation go hand in hand. Through research, dialog, and education, we aim to create a future where trust in science flourishes, sustainable advancements thrive, and joint efforts drive meaningful change.



We embody the values of an enlightened society through knowledge creation and dissemination in an evidence-based and socially responsible dialog and act as a catalyst for reflected thinking and ethical action, ensuring integrity in scientific work and fostering trust and global exchange.

With a 200-year history, we are, where tradition meets transformation, where academic curiosity fuels societal progress, and where all members of our KIT community can achieve individual growth.

KIT pioneers the reinvention of a modern scientific organization, questions conventions, and embraces progress. Governance plays a crucial role in ensuring agility and impact by aligning structures with evolving tasks and responsibilities. We are committed to driving internal transformations to ensure an organization and governance suitable for new challenges and new demands, supported by a central administration characterized by service and operational efficiency.



Guided by the principle of subsidiarity, we believe that when each person takes responsibility appropriate to their role, KIT as a whole succeeds. We commit to true leadership by owning responsibility and empowering others through clear, confident delegation. And we grow leadership at all levels – by developing new leaders and helping experienced ones continue to evolve.

KIT continues to evolve towards a transparent, flexible, and dynamic organization, which is internationally recognizable and competitive in our educational offerings and opportunities for researchers, in particular for activities focused on the attraction of national and international talent.

KIT is committed to leadership in the transformations of digitalization and sustainability and sees this as an essential part of our future. We use the KIT campus as a living laboratory to develop and implement this dual transformation as a demonstrator at scale – as an example of the deep societal changes needed in the coming decades.



The combination of complementary expertise creates synergies that drive progress in research and education. By joining forces with academic, industrial, and societal partners, we enrich teaching and research and accelerate innovation.

Exchange with academic institutions broaden our knowledge base and sharpen our innovative edge while offering opportunities for deep and innovative partnerships in research and education. Strategic partnerships and knowledge exchange cultivate an environment where ideas flourish, unlocking groundbreaking discoveries.

Our international partnerships as well as student, researcher and staff exchange programs reflect our commitment to a global outlook, while we remain deeply rooted in our local and regional environment. Located in the heart of Karlsruhe, we actively engage with the community, integrating citizens into research efforts and welcome the citizens to KIT. Our engagement in close bilateral international partnerships, strategic regional initiatives and international and European networks exemplify our vision of a borderless research and educational ecosystem.

Collaboration with industry ensures that our work remains forward-looking, relevant, and application-driven. KIT is a solution-oriented partner – whether tackling scientific questions, developing infrastructure, offering education or novel solutions of societal relevance or adapting technologies. Our industry partnerships generate real-world insights and pave the way for technological advancements that benefit society.

Engaging alumni and strong philanthropic activities are essential to advance ambitious projects in education, research, and innovation. Our alumni form a powerful community of mentors, pioneers, and influencers – partners, strengthening KIT with pride and lifelong connections.

Collaboration is more than a principle; it is a driving force, embedded into the fabric of KIT. By working together, we advance knowledge, address societal needs, and generate impact. We invite partners to join forces with us to develop the next generation of sustainable and resilient solutions.





ADVANCING SCIENCE AND INNOVATION

Through its core missions – Education, Research, Innovation, and Societal Engagement – KIT continues to push boundaries, explore new paths, and stimulate a dynamic and open exchange, always with a commitment to advancing science and innovation.

As The University in the Helmholtz Association, we are committed to provide leadership from insight to solutions. The interaction of fundamental sciences and engineering yields extraordinary potential and drives forward progress and societal change. This is the essence of Science for Impact.

Our key areas of expertise foster interdisciplinary collaboration across engineering and applied research with the fundamental, natural and social sciences, and informatics, leading to a synergistic integration of research and education. We promote innovation by integrating diverse fields of knowledge, creating impactful, sustainable, and resilient solutions of importance to Germany's technological sovereignty and security.

This not only enriches the academic environment but also equips learners and researchers with the skills and perspectives necessary to devise impactful solutions to complex problems of societal relevance.

The technologies that shape our lives – electric power, digital networks, synthetic materials, and microelectronic systems – all trace their origins back to fundamental research, pursued without knowing how transformative the outcomes would be. Such curiosity-driven research often provides the foundation for breakthroughs and societal progress, opening doors to discoveries that shape the future. Building on these discoveries, applied research transforms basic knowledge into solutions for global challenges, bridging the gap between insight and action, channeling scientific principles into innovations and social impact.

As all internationally leading institutes of technology, KIT is committed to excellence across the fundamental sciences, e.g. mathematics, physics, chemistry, biology and computer science. This is the foundation for our success in education and research and ensuring the freedom to pursue fundamental research is what lays the foundation for tomorrow's breakthroughs and innovation.



At KIT, AI-driven discovery transcends computation – it is a paradigm shift that redefines and expands existing boundaries of human knowledge and ability, while dramatically enhancing our opportunities for impact across science and engineering. We create an ecosystem where artificial intelligence is in focus across the entire spectrum, from the foundational layers of algorithms, data and software engineering, novel chip and chip-designs, and applications to its most tangible and transformative expressions, including autonomous systems and humanoid robotics. This holistic approach empowers groundbreaking research, enabling AI not only to accelerate scientific knowledge creation as an active agent of exploration, innovation, and interaction but also to ensure that AI remains a driving element in the twin transformation, linking digital progress with sustainable impact.



KIT leads the way by creating a future where technology enriches human interaction, preserves our shared humanity, offers solutions, and inspires us to build a more thoughtful and connected world. We combine strong scientific expertise with robust, adaptable and sustainable high-performance computing infrastructure to build a future-proof workforce while advancing AI research. As a hub for digital and physical exploration, we bridge the gap between virtual models and real-world systems, accelerating scientific discovery, and transforming how we impact the world.

We recognize that these rapid developments pose essential questions of transparency, equality, access and explainability, and we are committed to integrating these questions into our continued pursuit. While KIT leads in AI research, equipping individuals with the knowledge and tools to thrive, we integrate AI literacy into our curricula and are committed to ensuring the development, deployment, and use of responsible and impactful AI.



Technological innovations have profoundly transformed human life, driven by the synergy between molecular biology, precision engineering, and computational advances.

We are committed to harnessing advanced technologies for the benefit of society, with a particular focus on addressing the challenges of an aging and increasingly diverse population. Building on our strengths, we explore novel technological approaches that address complex challenges at the human-technology interface. From intelligent assistive technologies to AI-powered healthcare solutions, robotic companions and the creation of

new therapies through molecular biology, we create innovations that enhance our quality of life, enable independence, and ensure that technological progress translates into real-world well-being and prevention.

By seamlessly integrating virtual intelligence with its physical embodiment and emerging technologies, we are shaping a future where AI is not simply a tool to improve our quality of life but a collaborative partner in unraveling the unknown – always with humanity at its center.



A sustainable society does not simply emerge – it is created, thoughtfully and boldly. The nature of KIT, combining fundamental sciences and engineering in both university and large-scale research tasks, positions it uniquely to contribute to this essential transformation. It is our responsibility – and our opportunity – to contribute to sustainable and resilient solutions to the grand challenges of our time.

Our research focuses on critical areas such as energy transition, resource use, circular economy, new models of urbanization, and sustainable mobility. By integrating climate protection, climate adaptation, and sustainable living, we develop knowledge-driven resilient solutions that define the path forward.

We thoroughly embed sustainability into our academic programs, empowering students, staff, and scientists to lead responsibly. Our commitment extends beyond research and education – sustainability principles guide our governance, resource management, and infrastructure.

Through research, teaching, transfer, and ethical stewardship, we actively promote sustainability. We rise to this challenge and work collectively toward a resilient and equitable future.

In a world facing mounting global challenges, science plays a seminal role to ensure a secure and resilient future. At KIT, we contribute to this in our physical foundations – like energy supply, food security, and infrastructure – as well as in our digital systems, from virtual platforms to robotics and autonomous technologies.



These developments not only focus on technological solutions but also serve to protect our democratic institutions and our fundamental values through research that anticipates risks, reinforces societal stability, and supports evidence-based policymaking.

As a driver in the creation of novel fundamental critical technologies, we seek to actively advance technological sovereignty to strengthen Germany's capacity for self-determination and emphasize its role as a reliable partner in global cooperation.

Innovation thrives on breaking patterns of conventional thinking, creativity, and the courage to challenge the status quo. By empowering individuals to explore the unknown and challenge the known, we create an environment where transformative ideas can flourish and mature.

The path to innovation is rarely linear. It is filled with trials, unexpected turns, and moments of doubt. In a supporting ecosystem, challenges become opportunities. Embracing failure as a learning experience and cultivating an entrepreneurial spirit is essential to enabling innovation.



At the forefront of groundbreaking discoveries and transformative ideas, KIT supports cutting-edge research, patents, spin-offs, start-ups and real-world labs. We actively enable an ecosystem that bridges science and engineering, entrepreneurship and industry, and policymakers and civil society to transition ideas and fundamental discoveries into tangible societal benefits.

Encouraging curiosity requires exposure to diverse perspectives and inter- and transdisciplinary collaboration. By facilitating spaces for exchange, we create conditions where knowledge transfer and entrepreneurial thinking become second nature.

Innovation flourishes where creative individuals with visionary ideas meet the right support. Through mentorship and strong networks, we connect talent with experience to accelerate progress. Our alumni entrepreneurs, mentors from in-

dustry, and foundations provide future innovators with invaluable guidance, helping them navigate the inevitable highs and lows of their journey. From students to senior researchers, we provide tailored support mechanisms that enable innovations and value creation while minimizing barriers to success.

We embody this mission by providing the tools, the environment, and the support needed to empower visionaries to bring their ideas to life and provide solutions to society.





NURTURING TALENT

At the heart of KIT are the people who contribute to science at every career stage. They are the driving force, which makes KIT a vibrant place. Talent is our future, nurturing talent our passion.

Talent is likely Germany's greatest resource. Advancing knowledge and pushing the boundaries of discovery require outstanding researchers, highly skilled professionals and supporting environments.

We, at KIT, cultivate an environment where exceptional talent flourishes, and where knowledge transforms into action. The grand challenges of our time demand creative minds, and we empower the next generation of thinkers, innovators, and problem-solvers. We do more than impart knowledge – we inspire critical thinking, creativity, and the courage to ask the right questions – and allow for failure in the pursuit of bold solutions. Nurturing talent means fostering a culture of continuous learning, development, and adaptability. From pupils, students, and educators to senior researchers, and leaders, we empower individuals with the skills and the mindset needed to thrive.

Our administrative and technical teams are an integral part of reaching the goals of our mission. They build the structures that allow scientific talent to develop, to help ensure that innovation is not hindered by bureaucracy but empowered by efficiency, foresight, and strategic support. We invest in professional development, encourage collaboration, and provide the opportunities needed for our administrative and technical experts to grow with KIT and help forge new paths for scientific and institutional excellence.

By nurturing the best minds across the entire spectrum of KIT staff, we create an environment where visionary ideas become reality and where our collective impact benefits society as a whole.

The personal and professional development of pupils and students is a privilege and a central responsibility we take very seriously. Our mission is not simply to educate but to ignite a passion for discovery and innovation, especially among underrepresented groups.

KIT actively engages with schools to spark curiosity and enthusiasm for STEM subjects. Through tailored programs, we create an accessible and exciting introduction to the natural and social sciences, and engineering.



By working closely with educators, we ensure that impactful outreach aligns with classroom needs to develop offerings for educators that assist in this process.

While advanced educational offerings are provided in English, we are committed to offering the majority of undergraduate training in the national language. However, in areas of critical national importance and need, we provide undergraduate studies also in English to enable a larger international participation in support of national needs for talent and skill.

We position our alumni, researchers, partners, and students as ambassadors, passionately communicating their fascination for science and technology. Through storytelling, demonstrations, and relatable narratives, they inspire others to embark on their own journeys or inform the broader society of the importance of science and engineering in the resolution of the central societal challenges.

We are committed to positioning women and underrepresented groups in STEM as visible role models. Representation matters. By highlighting their achievements in science, we challenge stereotypes and inspire individuals to pursue their interests in these fields. Targeted initiatives, mentorship programs, and visible success stories ensure that young people from underrepresented backgrounds see STEM as a welcoming and rewarding path.

Our efforts are driven by the conviction that science and innovation thrive when everyone contributes – diversity is a strength. By inspiring individuals, promoting growth, and championing inclusivity, we aim to shape a future where STEM fields reflect the diversity, creativity, and brilliance of the world around us.

We support an environment where learning is an ongoing, transformative process.

While our strength lies in the natural sciences engineering and technology, we integrate perspectives from economics, the social sciences and humanities to address key questions at the intersection of humans, nature, society, and technology. Large-scale research projects and hands-on project-based learning practices inspire students with purpose, showing them the tangible impact of their contributions and emphasize the value of interdisciplinary work.



Artificial intelligence is a transformative force that drives and accelerates the evolution of learning and learning sciences. AI revolutionizes teaching and learning with the potential to enhance efficiency, personalization, and accessibility. Advanced real-time personal assistants transform learning and learning models, and translation tools boost global collaboration, making learning truly inclusive and boundary free. AI-assisted virtual learning environments provide new ways to experience and learn in the virtual or augmented world. We continuously evolve our programs and learning environments to meet the increasingly diverse needs of future students and trainees – towards a model where learning can happen anywhere, anytime, and with anyone.



Education is a lifelong journey, thriving on adaptability and bold ideas. Lifelong learning opens new perspectives and increases flexibility in both personal and technological development.

Rapid technological advances, globalization, and evolving job markets demand continuous upskilling and reskilling. Nations benefit from and increasingly require an adaptable workforce, making lifelong learning crucial for economic growth. Demographics necessitate ongoing education throughout careers and KIT democratizes access to education by offering programs for learners of all ages. By embracing curiosity, collaboration, and responsibility, we create lasting impact throughout careers.

Our diverse information and training programs empower people at every stage of life – whether seasoned professionals exploring new horizons, children uncovering the wonders of science and engineering, or citizens engaging with our research – while we, in turn, benefit from this exchange and channel it into our institutional growth.

We are the lifelong partner for the educational needs of our students and alumni.

Attracting the brightest minds worldwide is our unwavering goal and we are committed to taking the steps needed. We cultivate an environment where exceptional talent unfolds – supported, challenged, and inspired at every stage, independent of their background. We are committed to all employees at KIT, offering them exciting and attractive career and development opportunities.



Outstanding conditions empower early-career researchers to pursue their own agendas and build inspiring networks. With tailored mentoring and strong supervision, we enable young researchers to unlock their full potential.

As part of the Helmholtz Association, our researchers benefit from an exceptional network, cutting-edge resources, interdisciplinary expertise, and diverse career opportunities.

Careers are increasingly non-linear, shaped by individual strengths and opportunities. We embrace this evolution, valuing unique career paths. Training and retaining top talent across KIT equips individuals with skills that benefit both KIT and the broader scientific and economic landscape.

By embracing flexibility and lifelong learning, we empower individuals to pivot, adapt, and excel. At KIT, we don't just foster careers – we cultivate futures.





Karlsruher Institut für Technologie

LET'S MAKE KIT SHINE – TOGETHER!



Photo descriptions and credits

title: KIT celebrated its 200th anniversary with the drone show "KIT Skylights"; *photo: Ruth Schwartländer*

p. 3: KIT President Jan S. Hesthaven; *photo: Markus Breig*

p. 5: KIT's locations (from top left to bottom right): Campus South, *photo: Markus Breig*; Campus West, *photo: Manuel Balzer*; Campus East, *photo: Markus Breig*; Campus Alpin, *photo: Jonas Zilius*; Helmholtz Institute Ulm, *photo: Tanja Meißner*; Campus North, *photo: Markus Breig*

p. 6: Employees, students, and friends celebrating KIT's anniversary with an open-air picnic. *photo: Markus Breig*

p.7: Research, education, and dialog are fundamental to building and strengthening trust in science; *photo: Yuri Arcurs peopleimages.com – stock.adobe.com*

p. 8 top: KIT is committed to shaping its own development and internal transformation; *photo: Amadeus Bramsiepe*

p. 8 bottom: The ZEISS Innovation Hub @ KIT, where research is translated into applications; *photo: Cynthia Ruf*

p. 9: Researchers have developed electrolytes for calcium batteries that promise low-cost production and high energy density; *photo: Markus Breig*

p. 10: At its Energy Lab, KIT investigates the interconnected energy networks of the future; *photo: Markus Breig*

p. 11: Scientists are studying the characteristics of human brain development; *photo: Amadeus Bramsiepe*

p. 12: Working on an innovative production system that is highly flexible and automated; *photo: Amadeus Bramsiepe*

p. 12: Humanoid robots are meant to assist with household chores and caregiving in the future; *photo: Amadeus Bramsiepe*

p. 13: Public events in the city center are extremely valuable for promoting interaction between science and society; *photo: Magali Hauser*

p. 13: Model houses are used to demonstrate the effects of the energy transition; *photo: Amadeus Bramsiepe*

p. 14: Founders and aspiring entrepreneurs can exchange ideas at the networking events organized by the KIT-Gründerschmiede; *photo: Tanja Meißner*

p. 15: Presenting KIT's Test Field for Energy Efficiency and Grid Stability in Large Research Infrastructures at the Hannover Messe 2025; *photo: Sandra Göttisheim*

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p. 17: Exploring research and education on KIT's Open Day; *photo: Amadeus Bramsiepe*

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p. 19: At the Battery Technology Center, novel cell formats and safety standards are developed; *photo: Amadeus Bramsiepe*

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p. 21: KIT values diversity as a strength; *photo: Magali Hauser*

p. 22: KIT celebrated its 200th anniversary with the drone show "KIT Skylights"; *photo: Ruth Schwartländer*

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