The Protein Printer
By Hubert Filser

Ribosomes are molecular machines programmed by genetic blueprints, which make proteins by linking amino acids together into linear chains that fold into sequence-dependent shapes. LMU biochemist Roland Beckmann studies how they do it.

For the complete article, see www.en.lmu.de/news/insightlmu/2017/01_01.pdf

High-resolution imaging and structural analysis of nanomachines such as ribosomes requires high-performance computers. Roland Beckmann (left) in the data center.

Photo: Jan Greune

DenkStätte Weiße Rose: permanent exhibition reconceived
by Clemens Grosse

The first members of the White Rose were convicted of treason and hanged 74 years ago. The DenkStätte Weiße Rose in LMU’s Main Building commemorates their bravery and sacrifice. Opened 20 years ago, the exhibition has now been redesigned. Visitors from abroad can now experience the exhibition in English.

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A Revolution in Instrumental Seismology?
by Clemens Grosse

Seismology in Munich began over a century ago: A Wiechert seismograph at the LMU Observatory picked up the San Francisco quake of 1906. Now an LMU team has built a ring laser that measures rotational motions with unprecedented accuracy.

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Dedicated to the “European Idea”
by Elizabeth Willoughby

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In the sixth of the protest leaflets written and printed by the members of the White Rose – the resistance group initiated by LMU students during the Second World War – they called on their fellow-students to resist the Nazi regime: Students! The German people looks to us! As in the year 1813, when the Napoleonic terror was defeated, so they expect students in 1943 to end National Socialist terror by wielding the weapons of the spirit.

Sadly, they failed in their efforts to arouse broad-based popular support for their cause. Hans and Sophie Scholl were observed as they left copies of that leaflet at various points around the Main Building, and were subsequently arrested. The Scholls, Christoph Probst, Willi Graf, Alexander Schmorell, and Professor Kurt Huber were convicted of treason and executed in 1943, and Hans Leipelt met the same fate in 1945.

Their story and those of their many comrades who were active all over Germany is documented in the permanent exhibition that has been on display in the DenkStätte Weiße Rose initiated by the White Rose Foundation. The commemorative exhibition is located in what was once the faculty cloakroom in the Main Building – the very spot where the Scholls were arrested on that fateful morning in February 1943. – Now, 20 years after its inauguration, the exhibition has been reconceived and reconfigured, both in terms of content and with respect to its presentation.

Targeted to young visitors

Visitors are guided through the new exhibition by a stripe of blue glass. Photos and historical documents illuminate the origins of the White Rose as well as the activities of the group, which extended from the lecture theater to the frontlines of the war. Among the documents on display are the six leaflets they managed to print and the draft version of the seventh and final text, together with exhibits connected with their trials in Munich, which ended in their conviction and execution. Filmed interviews with contemporaries and a documentary feature which outlines how the leaflets were produced and distributed around the country give a vivid impression of the obstacles the young students had to overcome in planning and disseminating their courageous protests. Listening points equipped with headphones provide visitors with an impression of the conditions under which trials for treason were conducted, and the exhibition includes a selection of the philosophical, political and literary works that played such an important role in molding the opinions and moral values of the group’s members.

“We wish to ensure that memory of the White Rose and their legacy is kept alive on this very spot, and passed on to our contemporaries and to future generations,” says LMU President Professor Bernd Huber. “I am very pleased with the reconfiguration of the permanent exhibition in the DenkStätte Weiße Rose. It convincingly depicts the fate of the student resistance group and elucidates an important chapter in the history of LMU during the Nazi era in a fashion that should make a deep impression, particularly on young visitors.”

The search for a new approach to the presentation of the permanent exhibition began four years ago, under the auspices of the White Rose Foundation led by its Chairperson Dr. Hildegard Kronwitter. The concept finally chosen was then realized on the site over the last few months. Steps have also been taken to make the DenkStätte easier to find, and an elevator now ensures barrier-free access to the exhibits. In addition, visitors from abroad can now view and experience the exhibition in English. “The exhibition does not attempt to present visitors with any ready answers. Its purpose is to place the history of the group in the context of the Nazi dictatorship and the vicious war against which it unfolded, and to encourage each visitor to draw his or her own conclusions.”

www.weisse-rose-stiftung.de

Translation: Paul Hardy
A Revolution in Instrumental Seismology?

by Clemens Grosse

Seismology in Munich began over a century ago: A Wiechert seismograph at the LMU Observatory picked up the San Francisco quake of 1906. Now an LMU team has built a ring laser that measures rotational motions with unprecedented accuracy.

Heiner Igel is Professor of Seismology and Geophysics at LMU and Director of the Bavarian Earthquake Monitoring Service. Igel is a highly experienced researcher who knows his field inside out. But when the conversation turns to the new ring laser at the Bavarian Geophysical Observatory in Fürstenfeldbruck, his excitement and enthusiasm is palpable. “With respect to the monitoring of ground movements,” he says, “there have been no advances in instrumentation for decades.” Geophysicists realized very early that earthquakes give rise to tilting as well as transverse movements. “However, for technical reasons, it has not been possible to measure the magnitude of rotational movements until now.” The new ring laser, affectionately referred to as ROMY (the name evokes the Austrian actress Romy Schneider, but is actually an acronym for Rotational Motions in Seismology), is the first instrument of its kind. It detects and quantifies rotational ground movements with unprecedented precision by means of the Sagnac effect (the non-reciprocal behavior of light beams propagating in opposite directions in a rotating reference frame). The instrument, installed in a bunker 15 m underground, consists of four triangular ring lasers which form the faces of an inverted tetrahedron (12 m on a side).

ROMY exploits concepts from the fields of laser interferometry and seismology. But only when the instrument was commissioned last September, and a self-amplifying laser beam emerged from its upper ring (‘first light’) could the researchers be sure that their dedicated efforts during the 2-year planning phase had not been in vain. “It was a very emotional moment,” Igel recalls. “There is so much that can go wrong in a project that aims for nanometer precision.” ROMY was in operation when a series of earthquakes hit Central Italy in October 2016, and these measurements are now being analyzed.

Recognized as one of the leaders in his field, Heiner Igel won an Advanced Investigator Grant worth 2.5 million euros from the European Research Council (ERC) in 2013 for further development of the ring-laser concept, in close cooperation with Professor Ulrich Schreiber of the Technical University of Munich. “Even so, it would not have been possible to build our dream instrument without further funding from LMU, for which we are exceedingly grateful.”

The promise of rotational seismology

A large earthquake causes the Earth to reverberate like a bell. Analysis of the minute changes in the orientation of the rotation sensor with respect to the Earth’s axis will permit researchers to probe the structure of the earth’s interior in greater detail than ever before. However, data relating to the orientations of ground movements induced by seismic tremors also find application in other fields. Details of rotational displacements can provide structural engineers with useful information on the absolute motions of buildings during seismic events. Indeed, Igel’s colleague Dr. Joachim Wassermann will soon use a novel portable rotation sensor to assess the structural stability of the famous Campanile di Giotto in Florence. “We have been asked to assess the stability of historical buildings in the city under simulated earthquake conditions,” Wassermann explains. This makes sense, for buildings that are prone to torsional (twisted mode) displacements are particularly prone to collapse.

Portable rotation sensors

Naturally, instruments of ROMY’s size cannot be deployed everywhere, but the concept has sparked the development of portable rotation sensors. In March 2016, the French company iXBlue based in St. Germain-en-Laye, which produces state-of-the art navigational instruments such as fiber-optic gyroscopes for submarines and aircraft, introduced a portable rotation sensor called BlueSeis based on the ring-laser principle, which has been deployed on the island of Stromboli and other seismically active areas in Italy. In Heiner Igel’s words, this device represents “a milestone in instrumental seismology.”

Translation: Paul Hardy
Gynecology

Decision to Intervene
By Hubert Filser

Surgery and the benefits of thoroughness: Gynecologist Sven Mahner talks about the critical importance of surgical approaches in the treatment of gynecological cancers.
For the complete article, see www.en.lmu.de/news/insightlmu/2017/01_02.pdf

Media Research

Journalists on their robot pretenders

Journalists and editors believe ‘robo-journalists’ do not have a good nose for news and produce one-dimensional stories, according to new research published recently. However, despite these limitations, the report reveals plans for the technology to be rolled out more widely with the potential to replace “hundreds” of journalists at Thomson Reuters alone. The researchers, Professor Neil Thurman (LMU Munich), Konstantin Dörr (University of Zurich) and Dr. Jessica Kunert (LMU Munich), interviewed journalists, editors, and executives from CNN, BBC, Thomson Reuters, Trinity Mirror, and News UK in an exploratory study. The journalists were given hands-on experience with robo-writing software during a workshop. Robo – or automated – journalism, is software that converts structured data into stories with limited to no human intervention beyond the initial programming. It is used by news organisations including Associated Press, the Los Angeles Times, and Forbes. The journalists and editors in Dr. Thurman’s study believe robo-journalism’s reliance on data streams and the need to program news angles in advance means the stories produced lack the context, complexity, and creativity of much traditional reporting. Despite these shortcomings, journalists do believe robo-journalism does have the potential to reduce costs and increase the speed and specificity of some reporting. Journalists at CNN and Reuters thought it could “reduce costs” by replacing “expensive staff” who are doing “fairly simplistic and time-consuming work”. A Reuters journalist believed automation could improve speed and accuracy, and said “we are looking at it in all parts of the company”. Another Reuters journalist said automation will be used for stories they do not “have the resources to cover manually” or for topics currently below the threshold of reportability.

Educational Psychology

Finding the fun in maths

New work by LMU researchers on students’ emotional attitudes to mathematics confirms that positive emotions and success at learning in math mutually reinforce each other. “We found that emotions influenced students’ math achievement over the years,” explains Reinhard Pekrun, professor of psychology at LMU Munich and Australian Catholic University, who led the research. “Students with higher intelligence had better grades and test scores, but those who also enjoyed and took pride in math had even better achievement. Students who experienced anger, anxiety, shame, boredom, or hopelessness had lower achievement.”

The research was conducted as part of the Project for the Analysis of Learning and Achievement in Mathematics. It included annual assessments of emotions and achievement in math in 3,425 German students from grades 5 through 9. The study also found that achievement affected students’ emotions over time. The results are consistent with previous studies showing that emotions and academic achievement are correlated, but they go beyond these by disentangling the directional effects underlying this link. Specifically, the research suggests that emotions influence adolescents’ achievement over and above the effects of general cognitive ability and prior accomplishments. The study’s authors recommend that educators, administrators, and parents work to strengthen students’ positive emotions and minimize negative emotions related to school subjects, for example, by helping students gain a greater sense of control over their performance. They also suggest that providing students with opportunities to experience success may help reduce negative feelings and facilitate emotional well-being, which can promote students’ educational attainment.
Dedicated to the “European Idea”

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The Jenkins Scholarship, set up in 2003 at Oxford University, works in cooperation with Europaeum’s group of 11 leading European universities. In addition to Oxford and LMU, it includes Paris, Barcelona and Prague universities, supporting academic and cultural exchange in the Humanities and Social Sciences with an aim to ‘bridge Europe’.

Through the scholarship scheme, Oxford students are sent to other EU partner universities to further study, and students from the consortium are brought in to the University of Oxford. Established in memory of Lord Roy Jenkins, a British statesman, Chancellor of Oxford University, and President of the European Commission in the late 70s, students are enabled to carry out collaborative investigations on European topics in cooperation with member institutions. Some 70 Jenkins scholars havebenefited from the scheme so far.

Of the six most recent recipients of the scholarship, two are LMU students accepted at Oxford, and two are Oxford students accepted at LMU.

“LMU Munich joined the Europaeum in 2015,” said Dr. Paul Flather, Secretary-General of the Europaeum which is marking its 25th birthday this year, “and we have never had one institution in our twelve years so dominate our selections, let alone so soon after joining. It is a clear testimony to the abilities of the LMU applicants that they were able to outshine the many applicants from our eleven university members.”

Tilman Graff is one LMU student to which the Secretary-General was referring, and in the shadow of the UK’s vote to leave the EU, his two years at Oxford that began last September feel particularly poignant.

“In a period of deep uncertainty about the European identity of the United Kingdom, here’s an association so earnestly dedicated to Britain’s place within Europe,” says Tilman. “After having followed how the Brexit vote ultimately came down to a decision about the topic of European immigration to the United Kingdom, it was very reassuring to get to know people who are not yet ready to forgo the ‘European Idea’ and who still believe in the role inter-European academic exchange can play going forward, especially in a place like Oxford. I am very happy to be affiliated with this truly European organization.”

The European Idea

Fourth year PhD Dylan James is another of the scholarship recipients. Now in Berlin to improve his German language skills, he will finish his thesis on ancient Greek historiography (the writing of history) at LMU in Munich, chosen because of LMU’s excellent reputation in Classical Philology. “The opportunity to study in Germany that this scholarship has provided,” says Dylan, “allows me to experience a different academic culture and to foster a broader international network of academic contacts. This can only have positive results for my career.”

Ryan Crimmins, now in Munich with his wife and baby daughter, is the other Oxford student accepted for the Jenkins Scholarship to LMU. He couldn’t be more pleased to be doing the second year of his PhD at this university in particular. Touched by the warm welcoming of new friends, Ryan is also impressed with LMU students’ academic seriousness and engagement in their disciplines, which provides an atmosphere for easy, interesting conversations, and daily opportunities to speak about one’s own research and to learn about others’. He also finds LMU ideally suited to Europaeum’s mission statement.

“Doctoral research in the Humanities is often rather solitary,” Ryan says, “so it is very much a boost to be supported by such a distinguished institution. In addition to Munich’s excellent archival holdings, the stimulating atmosphere at the Historicum provides a community of fellow historians, which makes an indispensable contribution to both one’s research and ones development as a scholar.”

www.europaeum.org
The roofing ceremony for LMU’s new Nano-Institute on Königinstraße took place recently. The new building will provide laboratories, state-of-the-art clean rooms, offices, common rooms and conference rooms for researchers – and lots of space for instrumentation and technology. In addition to Professor Jochen Feldmann’s Chair of Photonics und Optoelectronics, a newly established Chair of Hybrid Nanosystems will also find a home there. The Nano-Institute is intended to provide a major contribution to the infrastructure required to implement the transition to sustainable energy sources (the Energiewende) in Germany. The Research Network “Solar Technologies go hybrid” will undertake basic research in the areas of photovoltaics and photocatalysis here. The major aim is to explore and develop innovative ways of converting solar energy into electricity and non-fossil energy sources. Indeed, the roof of the new building is designed to accommodate a photovoltaic system as well as test-beds for nanotechnology. Construction will be completed in 2018. The estimated cost of the venture is 33.5 million euros.

The building will be faced with patterned tiles coated with a special glaze – a reference to the significance of surface coatings in nanotechnology.

Electronic supplementary material
The building will be faced with patterned tiles coated with a special glaze – a reference to the significance of surface coatings in nanotechnology.

The European Research Council (ERC) is 10 years old this year. The ERC was set up in 2007 to support and stimulate groundbreaking basic research by providing generous grants for outstanding projects in Europe: ERC grants are awarded solely on the basis of the scientific merit of the proposed projects and are worth millions of euros. During the ERC’s first decade, LMU Munich has won more of these prestigious awards than any other university in Germany: At the present time, 61 of LMU’s academic staff hold ERC grants. The spectrum of fields involved ranges from Archaeology and Developmental Psychology to the Biosciences and Nanosciences.

“We are naturally very pleased that our researchers have been so successful in acquiring ERC grants. The financial support provided by the EU is a fundamental component of LMU’s third-party funding. Our roster of ERC grants is an eloquent indicator of the quality of our researchers and a reflection of LMU’s international standing,” says LMU President Bernd Huber.

The ERC’s programs are targeted both to established investigators and to young researchers who are at an early stage of their academic careers. The latter are eligible for so-called Starting Grants, which enable them to undertake ambitious projects and establish their own individual research profiles.

Furthermore, LMU offers tenure-track positions to researchers who have won a Starting Grant. These positions are limited to 5 years in the first instance but can be converted into permanent faculty posts subject to a positive assessment of the candidate’s performance. “LMU gives excellent researchers who have acquired an ERC grant the option of a temporary appointment at professorial rank,” says LMU Vice-President Dr. Sigmund Stintzing. “The aim of this measure is to enhance the career opportunities available to young researchers and provide them with a long-range professional perspective.”

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