

Taming the grey wave

“If a larger percentage of the population plans to stay gainfully employed until they approach 70, it has to be easier to accept salary cuts and less status towards the end of their professional careers”, says Professor Emily Grundy (picture).

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Body, soul and change

Resurrection is a key concept in the Christian faith, but it is extremely difficult to understand. Professor Vigdis Songe-Møller (picture) has gone to the sources and studied what the first Christians thought about resurrection, a concept that has also vexed philosophers ever since the subject of philosophy was ‘born’ 2500 years ago.

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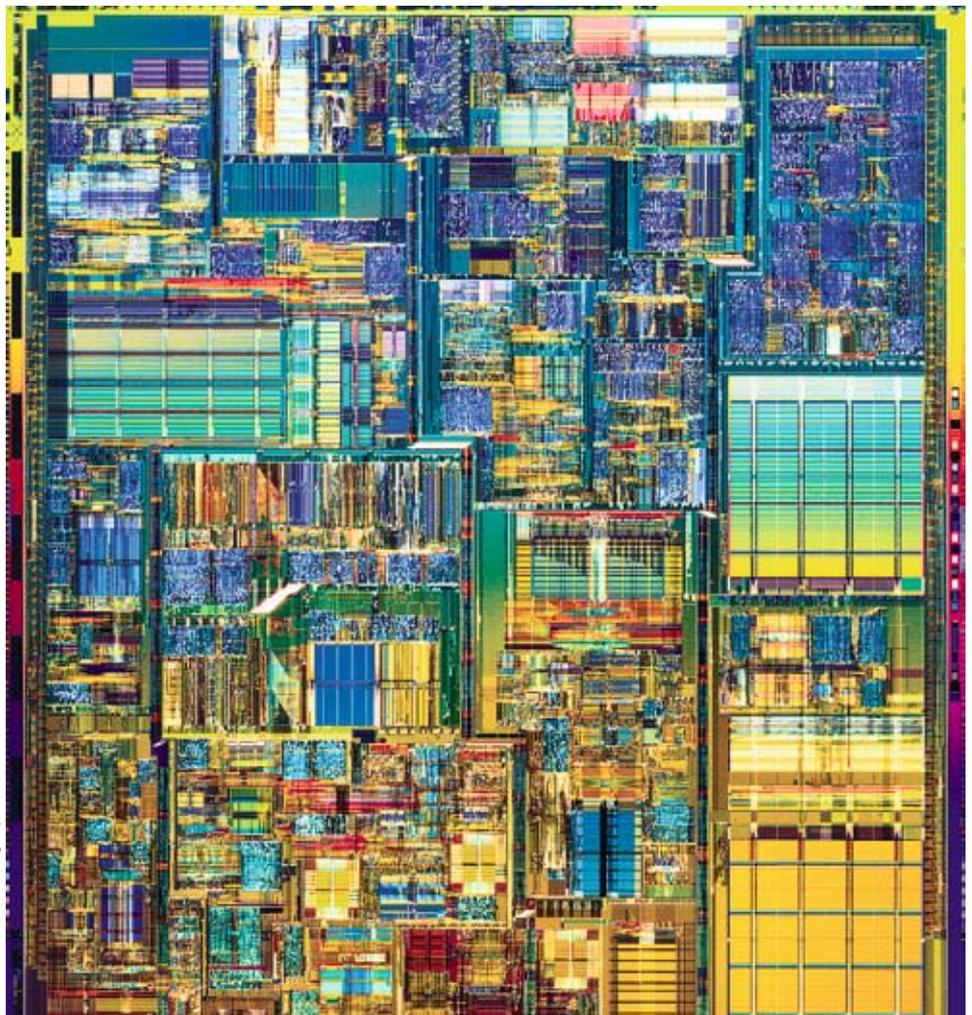


Attacking Moore’s Law

More than 30 years have passed since Intel-founder Gordon Moore articulated his famous ‘law’ stating that computers’ computing power would be doubled every 24 months. Incredibly, his prediction has held true up to our day, thanks to tremendous advances in processor technology (picture). Now, trends in nanotechnology are opening up entirely new possibilities.

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(Photo: Intel Technologies)



Outstanding and independent research

Outstanding research in Norway was on the agenda when Centre for Advanced Study, the Research Council of Norway and the Norwegian Association of Higher Education Institutions extended an invitation to a seminar and panel discussion. *Page 3*

Research quality and normal science

The Anglo-Saxon system for operationalising and ensuring research quality is based on two instruments: *peer reviews* prior to publication and the *number of citations* after publication.

Peer reviews are used in all disciplines, while citations are used more in the natural sciences than in the social sciences and humanities.

This system is not perfect: Peers can be wrong, and the number of citations depends on a work being read, understood and considered important. The history of science offers several examples of ground-breaking

works not being appreciated in their time and that it was indeed difficult to even get them published in respected journals. Thus the really good scientists, the pioneers, have no guarantee that they will be 'caught' under the current system. Rosalyn Yalow, winner of the 1977 Nobel Prize for Medicine, suggests the following explanation: "*The really visionary,*

creative researchers are never evaluated by their peers. They have none!" From this perspective, peer reviews are a tool for filtering out not only the poorest works but also the best ones.

It is *normal science*, as defined by Thomas Kuhn, that benefits from this system and provides fodder for the volume of citations. Qualitatively good works from the periphery of what interests most researchers usually generate fewer citations than works located in the centre of their area of interest. Thus the system motivates researchers to leave academically marginal areas and move into the mainstream. In other words, the system reduces opportunities for major scientific breakthroughs. Notwithstanding, even if the evaluation criteria cannot usually capture the very best, it is difficult to envisage a good alternative to the current system. The challenge lies in further developing what we already have.

In the light of this, it is positive that the European network of CAS institutions, NetIAS, will be discussing this system with a view to increasing the relevance and value of these quality criteria for all fields of research at its meeting in Bologna in April.



Willy Østreg
Scientific Director

The mystery of change

Resurrection is a key concept of the Christian faith, but represents a tremendous problem since it is difficult to understand such change. Christianity shares this problem with philosophy, which began to wrestle with the issue of change no less than 2500 years ago.

"Early philosophy and Christianity overlap in discussions of the issue of change. With the notion of the resurrection of the dead, Paul broke dramatically with the ancient Greek idea of change as an irrational phenomenon. Paul may be said to have introduced a new paradigm, at the same time as he obviously was affected by Greek thinking. I feel it is interesting to study the relationship between these two ways of thinking; two ways that have had such a tremendous impact on Western culture right up to our times", explains Professor Vigdis Songe-Møller.

Songe-Møller is a professor of philosophy at the University of Bergen and a member of Professor Turid Karlsen Seim's research group at the Centre for Advanced Study that is studying texts from the early days of Christianity. The researchers place special emphasis on understanding how the early Christians felt about changes or metamorphoses, notably the resurrection of the dead.

"It is customary to say that Greek philosophy began with Thales who predicted a solar eclipse already in 585 B.C. However, the concept of change did not seriously enter into philosophy before Parmenides, nearly a century later. On the other hand, he made the paradox of change into a problem with a capital P, and the issue remained prominent for the next few centuries", continues Songe-Møller.

Parmenides was thorough, stating that there is no change, since "what is, is – and what is not, is not". There is no third possibility, meaning there is nothing between existence and non-existence, and that there is no transition between existence and non-existence, i.e. there is no death, birth, growth or change. Here, as with later Greek philosophers, reason determines what exists.

From Plato to Paul

"Plato, who lived in Athens from 427 to 347 B.C., might be said to have been obsessed by change", asserts Songe-Møller. He made a distinction between the ever changing world of sensibles on the one hand, and the immutable and real world of forms on the other. The changes we experience are ultimately illusory, for the simple reason that they cannot be explained rationally.

In his dialogue *Parmenides*, Plato neverthe-

less attempted to explain change, suggesting that it originates in 'the moment', itself outside of time. So we come to the Apostle Paul, largely the determinant of the Christian church's understanding of the mystery of metamorphosis. Paul also experienced great personal change when he was on his way to Damascus to continue his persecution of Christians, but was blinded by a sudden vision in which Jesus Christ said to him that he had been selected to spread the Christian faith to the heathen.

Paul was opposed to Plato's dichotomy between body and soul to the extent that he felt that it is not the soul, but a sort of non-flesh and blood, spiritual body that arises. But with a view to resurrection as change, he got closer to Plato again, explaining that it takes place in an extraordinary instant on the edge of time. Many still allow themselves to be moved by this version every time Händel's 'Messiah' is played:

The trumpet shall sound, and the dead shall be raised incorruptible, and we shall be changed.

"The problem of change is not just something that vexed the philosophers of times past. I would like to give you a little example. The day before my oldest son turned five, he asked: "Must I die before I can be five years old?" He could not understand how a four-year-old could suddenly be transformed into a five-year-old without the four-year-old first being eliminated. It was an intelligent question", points out Songe-Møller.



Turid Karlsen Seim and Vigdis Songe-Møller study texts from the early days of Christianity. (Photo: Bjarne Røsjø)



Gunnar Öquist (left) is Secretary General of the Royal Swedish Academy of Sciences. Pictured here awarding the 2006 Nobel Prize in Physics along with Per Carlson, Chairman of the Nobel Committee. (Photo: Bertil Ericson/AFP/Scanpix)

“Norway needs more blue-skies research”

“Norway needs to strike a better balance between blue-skies research and applied research,” states Professor Gunnar Öquist. He was invited to talk about outstanding research in Norway as ‘seen from the outside’ at a seminar in October 2006, and he gave some clear advice to the politicians that set Norwegian research policy.

Gunnar Öquist is Secretary General of the Royal Swedish Academy of Sciences, which is behind the annual awards of the Nobel Prizes in Chemistry and Physics. In addition, he is Sweden’s representative on the European Research Advisory Board, a member of the Board of the University of Bergen, and a member of the international panel for the selection of the first round of Norwegian CoEs. Öquist has also taken part in a number of research evaluations, so this professor of plant physiology at the University of Umeå is very much worth listening to when he talks about the organisation of European, Nordic and Norwegian research.

“Research has two legs to stand on, and it needs both of them. The one leg consists of

independent, long-term, curiosity-driven basic research, call it ‘the art of research’, if you will, where new knowledge is the primary goal. The other leg is applied, more short-term, useful research that seeks to solve practical problems. A research policy that does not strike the right balance between these two types of research is doomed to fail”, stated Gunnar Öquist at the seminar organised by Centre for Advanced Study, the Research Council of Norway and the Norwegian Association of Higher Education Institutions.

Unexpected knowledge

“Blue-skies research can be exemplified by Galileo Galilei, while applied research is represented by Sir Francis Bacon, who wanted to organise research almost like an industry. I believe that every country’s research policy must strike the best possible balance between these types of research. Today we face so many challenges related to e.g. climate, health and welfare, that we must also allocate money to blue-skies research in order to generate entirely new, unexpected knowledge”, underlines Öquist.

Professor Öquist confirms that the allocations to blue-skies research in Norway through the Research Council of Norway account for less than 20 per cent of total allocations, indicating that the country’s research has been overly programme-driven. The criticism also applies to

some extent to the establishment of the Centres of Excellence (CoE), although Öquist emphasises that the scheme is generally a very positive initiative.

Clear advice

“It’s been absolutely necessary to concentrate on such ‘Centres of Excellence’, which to some extent seek to reconcile ‘the art of research’ with ‘research as a useful tool’. What is lacking in the Norwegian CoE scheme is the space to grow organically from the inside, by granting skilled researchers the opportunity to set up a centre that could possibly cost MNOK 10 per year even though their topic does not stem from a large-scale research programme”, points out Öquist.

Professor Öquist is crystal clear in his advice about what should happen when the CoE scheme turns 10 years old: At that point, the first centres ought to be closed down, even though the closings may initially be met with considerable resistance. “The Danes have had a similar programme for 15 years, and I helped evaluate the programmes after the first term. The Evaluation Committee’s recommendation was that the centres should be closed, and as it turned out, the universities subsequently took over the centres that maintained the highest standards. The time was well spent grooming a new generation of researchers who got an opportunity to create new centres”, recounts Öquist.

To maintain a stable population in a nation without immigration, every woman must bear an average of 2.07 children, but birth rates in large parts of Europe are far below that figure. In Spain, Italy and Greece, birth rates dropped below 1.3 already in the late 1980s. In the 1990s, the trend spread to a number of countries in Central and Eastern Europe. Now the same trend is in the process of taking root in countries such as South Korea and Japan, while Norway and the other Scandinavian countries still have somewhat higher birth rates.

For a long time, it was anticipated that the very low birth rates would start to rise again after a period of transition, so it created quite a stir in 2005 when Professor Hans-Peter Kohler stated that the very low fertility rates in large parts of Europe have probably come to stay – for a long time. One reason is that young women who used to have their first child in their twenties are now waiting until they are about 30 to have children. Simply put, the major social and financial changes that have taken place can hardly be expected to turn around.

Adaptation possible

Hans-Peter Kohler is an associate professor of sociology at the Population Studies Center at the University of Pennsylvania in the USA, and an

Europe: A global old people's home?

international expert in his field. In spring 2007, he is affiliated with the research group *Changing Family Patterns* at CAS, which is being chaired by demographers Nico Keilman and Øystein Kravdal from the Department of Economics at the University of Oslo. Kohler believes Europe is in the process of turning into a continent with a more aging population than in most other countries,



yet he still does not fear any of the doomsday prophecies.

“Europeans will probably have to accept that the continent’s international power will diminish, but the most salient question is whether their standard of living will be reduced significantly, and I do not think that will happen”, explains Kohler.

“Demographers have long since shown a corre-

Good planning is the key

The upcoming ‘grey wave’ of baby boomers reaching retirement age may create serious problems for Norway and even greater problems for many other European countries. The good news is that tomorrow’s seniors may be in better health than today’s and should to some extent manage to care for themselves.

The number of people aged 67 or more in Norway could potentially increase from some 600 000 in 2005 to between 1.1 and 1.6 million in 2060. As a result, it will be incumbent upon ever fewer employed people to support an ever growing number of pensioners. A similar trend is set to evolve in many other affluent countries as well, and many will be hit far harder than Norway.

“You have taken a very sensible approach in Norway, for example, you already have a higher retirement age than in many other countries and you

have public care for older people that is not based solely on help from families. However, there are still a myriad of tasks to address”, remarks Emily Grundy. She is a professor of demographic gerontology at the Centre for Population Studies at the London School of Hygiene & Tropical Medicine and a member of the research group working on *Changing Family Patterns* at CAS in 2006–2007.

All areas of policy will be affected

The rising average age of the population will have

consequences far beyond the purely economic. “Virtually every area of policy will be affected. For that reason, the authorities in most countries, including Norway, have already begun to plan for the upcoming ‘grey wave’ of baby boomers reaching retirement age on a far broader front than before. The growing percentage of seniors may, for example, call for housing stock that is different from existing housing. Nor has anyone yet given any clear answer to the question of who will be providing care for the large share of elderly in 2050”, underlines Grundy.

Professor Grundy also points out that the large number reaching retirement age can be countered by many types of measures, and that the trend may also have positive aspects. “For example, today’s seniors generally have better health than before and, in a variety of ways, technological developments can make it easier to be old. We have, for instance, seen that an invention like the microwave oven has increased the share of elderly men

lation between growing affluence and declining birth rates. However, it is interesting to note that we are seeing a certain rise in fertility again in the countries at the top of the welfare scale, e.g. the Scandinavian countries and the US”, confirms Kohler. “It is likely that the well-developed welfare schemes contribute to this in Scandinavia, while the rising birth rate in the US is more likely ascribable to the large, smoothly-functioning market that enables young families to purchase services to make life easier. We are talking about two very different mechanisms, although the result is the same.”

The answer to reduced fertility and the rising average age in Europe involves raising the retirement age, among other things, and that working life be better adapted to seniors. In addition, the elderly European population is being supplemented by the immigration of younger people from other continents.

It is first and foremost the transition that might be painful, while we wait for large groups of people to accept less generous pension plans and other reforms. “Like it or not, however, reforms of this type will push themselves forward. My optimistic evaluation is that Europe and to some extent the US are on the threshold of serious demographic problems, but that it will be possible for them to adapt”, deduces Kohler.



Hans-Peter Kohler.
(Photo: Maria Sætre)



(Foto: Stockexchange)

who manage to cook for themselves”, she points out. Additionally, it is important to remember that older people contribute to the well-being of younger generations and to society as a whole, for example through volunteer work, support to children and grandchildren, and community activity. Ways of facilitating these contributions are important.

Attitudes at work

Professor Grundy also advocates a change of attitude at work. “The existing attitude is that employees should climb higher up the career ladder and earn salary increases throughout their entire professional careers. However, if a larger percentage of the population plans to stay gainfully employed until they approach 70, it has to be easier to accept that they may have to take a salary cut and enjoy less status towards the end of their professional careers”, suggests Grundy.



Emily Grundy.
(Photo: Maria Sætre)



Jakob Lothe and Anette Storeide.
(Photo: Maria Sætre)

Time witnesses named Book of the Year

Time Witnesses, written by Professor Jakob Lothe and former Research Fellow Anette Storeide, was named ‘2006 Book of the Year’ by the daily paper *Morgenbladet’s* readers. The book project was conceived in connection with a research project at the Centre for Advanced Study.

Time witnesses tells eight stories and contains photographer Agnete Brun’s portraits of Norwegian survivors of of the concentration camp Sachsenhausen and the concentration and extermination camp Auschwitz during World War II. Readers describe the work as an important historical document and a book you will never forget.

Jakob Lothe is a professor at the Department of Literature, Area Studies and European Languages at the University of Oslo and headed the research group *Narrative Theory and Analysis* at CAS in 2005/2006. Post-graduate fellow Anette Storeide was part of the same group, and is currently member of the Board and administrative head of studies in the White Buses Foundation Auschwitz.

CAS researchers in CoEs

Former CAS researchers are members of the core group of two of the eight new Centres of Excellence (CoEs) selected by the Research Council of Norway in December 2006.

Professor Nils Chr. Stenseth has been head of ‘the Centre for Ecological and Evolutionary Synthesis (CEES)’ at the University of Oslo since its establish-

ment in 2003, and the centre has now been granted status as a CoE. Stenseth was head of the research group *The Mystery of the Lemming Cycle* at the Centre for Advanced Study in 1996/1997. Dag O. Hessen, head of the group *Food-webs, Stoichiometry and Population Dynamics*, is part of CEES.

Professors Bjørn Ramberg and Olav Gjelsvik are part of the core group of the new CoE, the ‘Centre for the Study of Mind in Nature’, headed by Professor Christel Fricke at the Department of Philosophy at the University of Oslo. Ramberg and Gjelsvik headed the research group *Towards a New Understanding of the Mental* at CAS in 2003/2004. Carsten Hansen and Jennifer Hornsby from the same group are also part of the new Centre. The same is true of Thomas Pogge, a fellow at CAS in 1995/1996 in Dagfinn Føllesdal’s group *Ethics – A just society*, and Professor Jan Terje Faarlund, head of the group *Linguistic Theory and Grammatical Change* in 2004/2005.



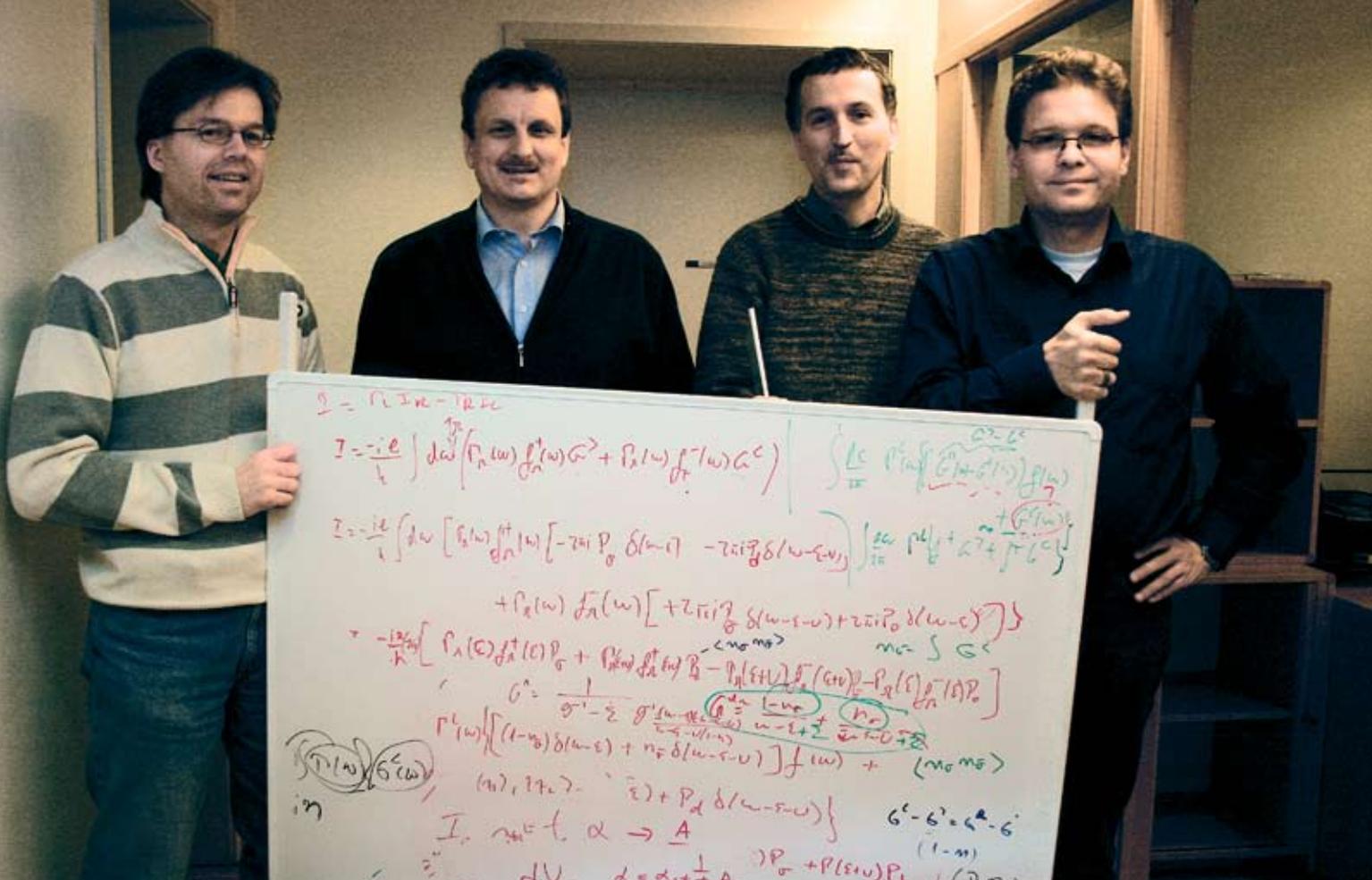
Anne H. Thelle and Torkild H. Lyngstad.
(Photo: Maria Sætre)

CAS researchers defend their theses

Anne H. Thelle defended her thesis entitled *Writing as Negotiation: A Narrative Analysis of Nakagami Kenji’s – ‘Kiseki’* in early March 2007 at the University of Oslo’s Faculty of Humanities.

The work on the thesis was partly performed at the Centre for Advanced Study, where Thelle was a member of the research group working on *Narrative Theory and Analysis* in 2005/2006.

Torkild H. Lyngstad defended his PhD thesis entitled *Four Essays on Marital Dissolution* at the Faculty of Social Sciences at the University of Oslo on 23 March 2007. Lyngstad is affiliated with a research group at CAS studying *Changing Family Patterns* in 2006/2007.



Arne Brataas, Wolfgang Belzig, Jan Martinek and John Schliemann use a rather advanced mathematical language when talking shop. (Photo: Bjarne Røsja)

Theoretical physics with revolutionary possibilities

It will probably take more than 10 years to develop the new computers envisaged by John Schliemann, Wolfgang Belzig, Jan Martinek and Arne Brataas, all of whom are professors as well as basic researchers. However, the result may turn out to be a revolution that thoroughly pervades everything related to information processing.

Computer technology has progressed by leaps and bounds since 1965 when Intel-founder Gordon Moore articulated his famous 'law', i.e. that the number of transistors and resistors in a given space (a measure of the computer's computing power) would double every 24 months. His prediction has held true up to our day, as computers have become increasingly more compact and far more powerful. At the time Moore's Law was articulated, a typical computer chip consisted of about 60 transistors and resistors, while Intel's latest processors contain nearly 1.7 billion units.

But computers are still rather stupid in certain areas. For instance, the fact that the RAM and the hard disc deal with information in completely different ways is not very practical. The RAM's processors handle data using electrical charges, while the hard disc stores data using magnetic fields. "A computer

that stores and processes data in the same way would be faster and more powerful. What is more, it would not empty the RAM when you turn off your PC, and you would not have to wait while your programs load from the hard disc", explains Jan Martinek.

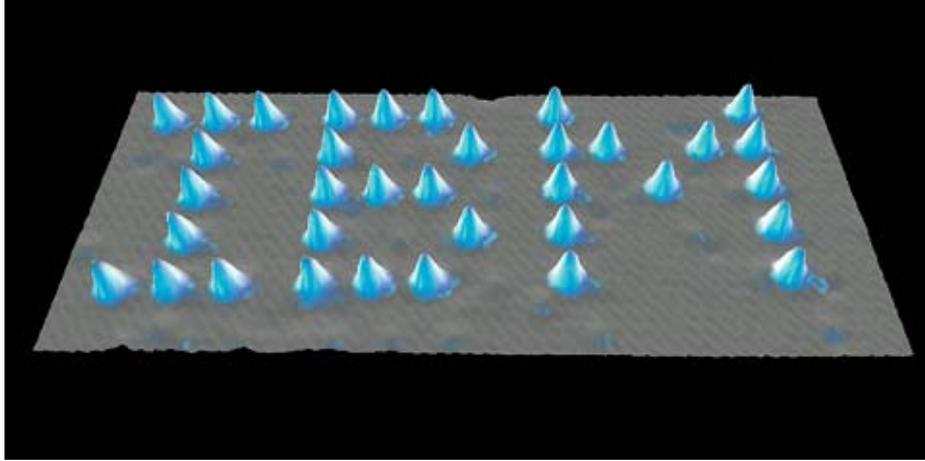
Arena for discussions

The four researchers make up the core of a group of more than 40 experts on theoretical physics who are using the Centre for Advanced Study as an arena for discussions and exchanging ideas in 2006 and 2007. Their research involves electrical and magnetic phenomena in nanostructures, i.e. structures that can be measured in nanometres or billionths of a metre (0.00000001 metre).

The researchers are by no means complacent about today's computer technology, which is based on processors that use electrons'

electrical charges to record and process data. "All electrons carry an electrical charge, but they are also small magnets because they have a spin that can switch between 'up' and 'down'. When the direction of the spin is changed, the direction of the magnetic field changes as well. We believe that it will be possible at some point to manipulate an electron's spin to allow us to store data based on the direction of the magnetic field on the individual atom. If that works, computers will have far more processor capacity than today, and we will no longer have to switch between storing data in magnetic fields and storing processor data on electrical charges", explains Martinek.

"Computers like that could perform extremely demanding operations. There are actually people who would prefer that we not develop such 'quantum computers', since they could be used to crack even the most complex



The world's smallest logo, written using 35 xenon atoms, represented a nanotechnological breakthrough in 1990. (Photo: IBM)

security codes. On the other hand, they could also be used to develop new and safer methods for information management”, comments Schliemann.

Faster and faster

John Schliemann, a professor at the Department of Physics at the University of Regensburg in Germany, is especially interested in spin phenomena associated with semiconductors. Wolfgang Belzig of the Department for Theoretical Physics at the University of Konstanz in southern Germany is mainly interested in the spin on superconductors, while Jan Martinek from the Institute of Molecular Physics at the Polish Academy of Sciences in Poznan is an expert on so-called ‘quantum dots’, a type of ‘virtual atoms’ that can be built up in semi-conductors for closer study. Arne Brataas from Department of Physics at NTNU (Norwegian University of Science and Technology) in Trondheim describes himself as an atomic sociologist, in the sense that he is interested in investigating the behaviour of large groups of atoms and particles. In combination, the four researchers’ different approaches can have an impact on the development of the supercomputer of tomorrow. For example, Brataas is studying the feasibility of converting data from a hard disc using high-precision electrical currents instead of the magnetic write heads used today.

The professors confirm that nanotechnology has already come far and has tremendous momentum. “Just imagine, the Quantum Hall Effect was proven just a little more than 20 years ago. It’s based on the fact that electron systems subjected to strong magnetic fields can only have conductivity that is exactly quantised. At the time, the phenomenon occurred only at temperatures of less than 250 degrees Celsius below zero, but as recently as in early March this year, there was a report stating that the effect has now been proven at room temperature. This effect has not previously had any practical application, except for being used as the international standard for electrical resistance. The new advance will facilitate the

development of new tools that can drive the research further”, states Belzig.

Nanotechnology just a click away

Another example that bears witness to progress stems from the IBM laboratory in San José, where a group of scientists managed to write the letters ‘IBM’ using 35 xenon atoms laboriously placed in individual pores on the surface of a nickel crystal in 1990. Back then, this nanotechnological breakthrough required the intense efforts of an entire small army of research assistants.

“These days, IBM researchers can move individual atoms with a technology that looks like a computer game. They have an image of the atoms on a screen in front of them, and they click on one atom at a time using the cursor to move the image of the atom to a different location. It still takes some time for the technician to perform the moving technique in actual practice, but the manipulation of individual atoms has become almost routine”, Martinek explains.

If it ever becomes commonplace to move individual atoms this way, there will be almost no limit to the possibilities and new materials that will follow. “Getting back to computers, I believe we will be governed by Moore’s Law for at least the next few decades. After that, we will probably see a revolution”, concludes Arne Brataas, head of the research group *Spin and Charge Flow in Nanostructures* along with Asle Sudbø of NTNU.

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sional activities are long-term in nature, and are to be permanent and independent of research policy, and political and financial influences.

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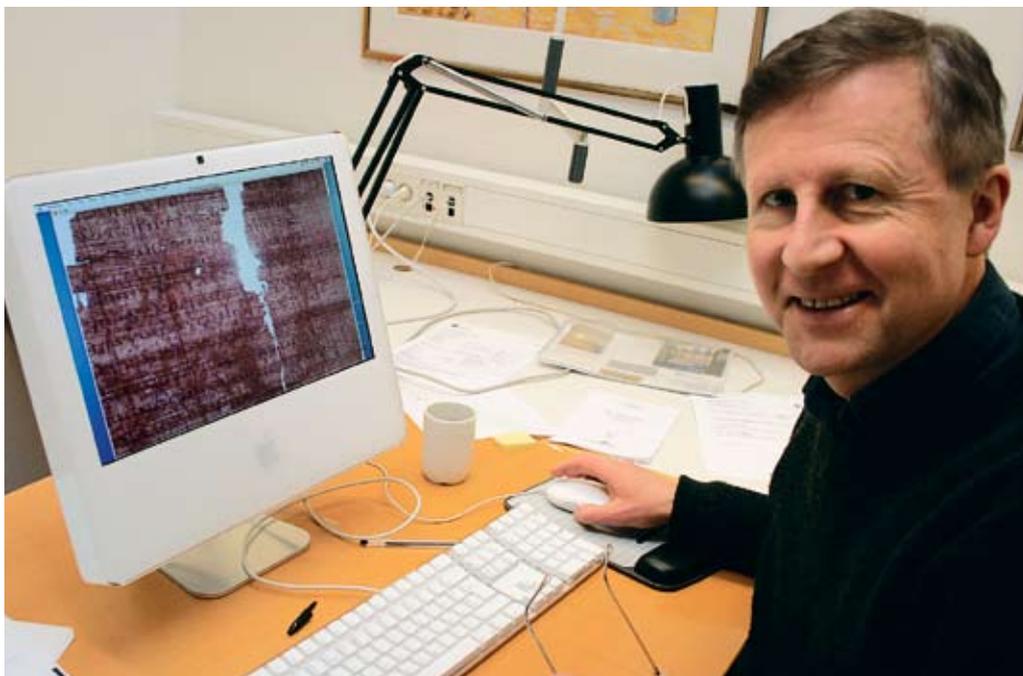
- The Humanities/Theology
- Social Sciences/Law
- Natural Science/Medicine/Mathematics

“Judas can nevertheless not be acquitted”

The first interpretations of the Gospel according to Judas, which were published last Easter, assumed that Judas was by no means a traitor. Professor Einar Thomassen has now had the opportunity to take a closer look at the Coptic text, and is of the opinion, like several other researchers, that there are nevertheless no grounds for acquitting Judas.

The Gospel of Judas is a Coptic papyrus manuscript from the third or fourth century that was found in a cave along the Nile in 1978. The manuscript was moved around a great deal for quite some time, but in connection with Easter 2006, the National Geographic Society in Washington published a complete translation to English. It created quite a sensation when the first interpretations suggested that Judas was ostensibly not a traitor, but was instead specifically chosen and assigned the task of turning Jesus over to the authorities for God's will to be done. Religion historian and philologist Einar Thomassen is now casting aspersions on this interpretation.

“There is, for example, a place in the first translation where Judas says: “What good is it that I have received it? For you have set me apart for that generation’ (i.e. those who will be saved). In our opinion, the sentence should be translated to read “What good have I then received, when you have set me apart from that generation?” We also found several other examples where Judas was hardly portrayed



Professor Einar Thomassen with the Coptic version of the Gospel according to Judas: He doubts that it offers sufficient evidence for ‘acquitting’ Judas. (Photo: Bjarne Røsjø)

a ‘hero’ in this gospel. He may possibly have been portrayed as the most insightful of the disciples, but none of the disciples ever obtained knowledge about the true nature of earthly existence’, explains Thomassen.

Testing hypotheses

Natural scientists have occasionally raised some doubts about whether religious studies and philology are ‘genuine’ sciences, but Thomassen feels there is a fundamental resemblance.

“Religious studies and philology are sciences precisely because it is possible to set up hypotheses and test them. In this case, there was an interpretation that required the text to be read in a particular way, but now it can be shown that that interpretation entails self-contradictions. It might be as simple as there being a gap in the manuscript, and that we can show that the lacuna quite simply does not have sufficient

space for all the letters needed for the first interpretation. The new translation leads to fewer self-contradictions and is therefore more probable than the original one’, observes Thomassen.

The world as an illusion

Thomassen adds that the Gospel according to Judas is a peculiar codex which has a lot in common with other Gnostic texts, where the material world is portrayed as a kingdom of the dead or an illusion created by a lower cosmic god. The real God is, according to the Gnostics, more glorified and only available to ‘the chosen ones’. The National Geographic Society’s translation makes Judas appear to be a privileged recipient of knowledge about the supreme god, but Thomassen’s interpretation shows that Judas instead had to make due with the highest knowledge available about people’s material and primitive world.

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