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researchtrends

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Welcome to the 16th issue of Research Trends, in which we focus on career development, especially for early-career researchers (ECRs). ECRs are defined by Professor Alan M. Johnson in ***Charting a course for a successful research career***. A guide for early career researchers as "researchers who are still planning and designing their research career, no matter how much time has passed since the award of their Ph.D."

Fundamental to any research career is ensuring that you publish your results in the best journals. Determining where to publish and tracking your performance can be facilitated by using citation-analysis tools, and we discuss the most significant metrics available.

Social-networking sites can also help researchers raise their profile and find collaboration partners; yet academics seem to be more interested in studying this phenomenon in their laboratories than actually participating.

In many professions, international experience can help candidates stand out in the job market, and this also true in the academic world. We discuss the merits of leaving your home institute to gain research experience abroad.

We also ask six successful early-career researchers from the UK/US, Poland and India for their secrets of success; no surprise that hard work is one of the most important. They also tell us how their performance is measured and the value of awards and publications to their careers.

Finally, we ask each of our successful early-career researchers to nominate their most inspirational researcher and then we review their publication records.

If you would like to comment on any of the topics covered, please use our feedback facility.

Kind regards,
The Research Trends Editorial Board

DID YOU KNOW?

"Publish or perish" has been worrying researchers for 60 years

Publish. Or. Perish. These three little words describe the constant pressure on academics to publish their research and make their name. But this is not a new phenomenon; these three words have been keeping researchers awake for over 60 years.

The phrase was coined in 1950 by Kimball C. Atwood III, a geneticist at Columbia University *(1)*. Although never written down, it struck a chord with researchers, and, so legend has it, it was just a month before the phrase found its way back to Atwood, in an address given by a visiting lecturer.

Despite the long history of "Publish or Perish", it is likely to ring around the halls of the world's research institutes as long as competition among researchers for limited funds and positions continues to intensify.

Reference
(1) Sojka, R.E. and Mayland, H.F. (1991) *Driving Science With One Eye On the Peer Review Mirror*

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Behind the data

Measuring your progress

TOM JONES

Researchers planning their next career step, especially in the early stages, need to be able to demonstrate their value in many ways. The gold standard, of course, is getting work published and cited in the peer-reviewed literature, but may also include acknowledgements in others' work, grant applications, conferences, reviewing manuscripts, blog posts (and the attention they receive), social networking, and establishing collaborations with colleagues.

When being assessed, quality is everything *(1)*. A prospective employer or tenure committee is less interested in how much you have published than in the quality of what you have published, as this is a good indicator of your future prospects of producing more outstanding research in the future.

Various metrics may be used to measure both the quality and the quantity of your research activity, and being aware of these, and your standing based on these metrics, is invaluable when planning your career path, no matter how much time has passed since the award of your Ph.D.

Metrics to get ahead

The number of publications and the number of citations they have received are good measures of the impact of your work, particularly when you are just getting started and it is still feasible to assess these publications individually.

The Impact Factor (IF), along with newer journal metrics, such as **Eigenfactor**, SCImago Journal Rank (**SJR**) and the Source Normalized Impact per Paper (**SNIP**) may also be used to assess your publications based on the quality of the journal in which they were published.

There are also metrics that can be used to assess authors directly. The *h*-index proposed by the physicist **Jorge Hirsch**, is designed to assess both your productivity and the impact of your work. Put simply, it states that you have an *h*-index of n when you have n papers with at least n citations.

Databases like Scopus provide an effective way of assessing yourself. Not only can it provide a list of your publications, how well cited they are and who has cited them (a great boon for future collaborations) and tools for giving SNIP and SJR rankings for journals in which you have published, it will also determine your *h*-index, or indeed, the *h*-index of any set of papers.

Keep a level head

One final thought. In the scramble to achieve quick successes and prove yourself by scoring citations it is important not to forget why you entered science in the first place. All competitive fields unfortunately suffer from a minority of cheats who believe winning points is more important than professional conduct. For instance, a recent investigation found that up to a third of Chinese scientists admit dubious practices, such as falsifying results or plagiarism *(2)*, in the race to succeed. But winning citations for fraud will not enhance your career in the long term. Not all citations are good citations, after all

Useful links:

***Charting a course for a successful research career. A guide for early career researchers*, by Professor Alan M. Johnson**

References
(1) Bourne, P.E. (2005) "Ten simple rules for getting published", *PLOS Computational Biology*, 1, pp. 341–342.
(2) Qui, J. (2010) "Publish or perish in China", *Nature*, 463, pp. 142–143.

Research trends

Social networking in academia

SARAH HUGGETT

During the past few years, the internet has taken a new, more interactive direction. With the advent of Web 2.0, users have increasingly become creators, and recently, social networking sites have mushroomed and their user base has grown. Indeed, a 2006 study by Nielsen/NetRatings estimated their annual growth at 47% and their reach at 45% of web users *(1)*.

Interest in social networking as a research topic has also risen in recent years (see Figure 1). Since 2004, the annual growth of academic publications on the subject has surpassed 21%, but how has this scholarly interest matched actual social-networking interest among academics?

Demand for social networking tools

Social networking as a tool to enhance one's career has proved popular in almost all sectors. In May last year, LinkedIn celebrated its sixth birthday by welcoming its 40 millionth member to the LinkedIn network, underscoring the growing importance of networking in today's world. As research becomes more multidisciplinary and global, collaboration is becoming more important, and social networking in the academic community can present leads and collaboration opportunities that you might never have found by other means .

Preliminary results of a recent survey of more than 3,000 researchers by a leading publishing house reveal that more than 55% of researchers would find a social-networking site targeted at researchers useful; unsurprisingly, this propor-

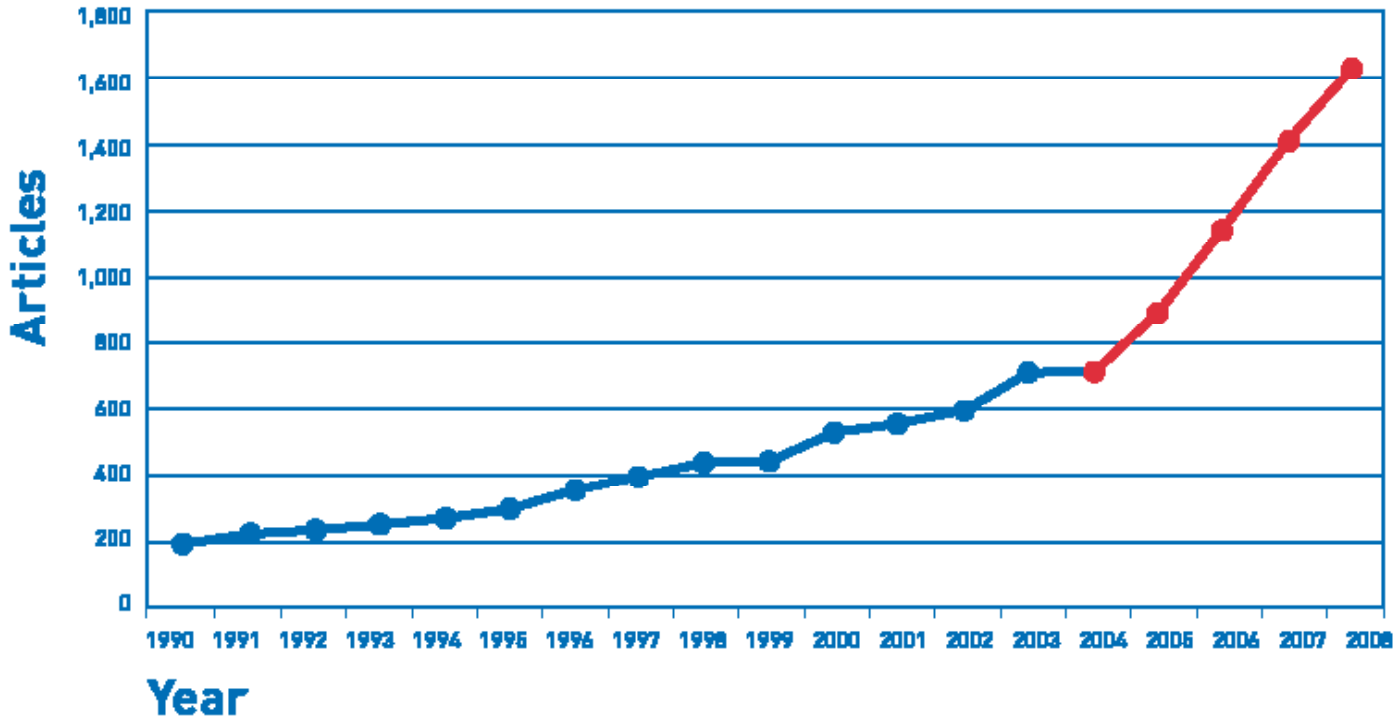

Figure 1 – After steady growth for more than a decade (blue line), scientific literature (articles, reviews and conference papers) with "social network*" in their title, abstract or keywords began climbing rapidly in 2004 (red line).
Source: Scopus

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tion rises to nearly 64% for early-career researchers *(2)*. According to Cathelijn Waaijer at the Centre for Science and Technology Studies, Social and Behavioural Sciences, University of Leiden: "I would use social networking sites specifically for scientists mostly because I like to have a personal connection to the people I work with. I also think that if they have the same connection to you, it might actually help you if you need any information from them."

The same study *(2)* shows that more than 37% use social networking sites personally, but only 12% professionally; for early career researchers, these figures are 56% and 13% respectively. Interestingly, while early-career researchers use social networking sites significantly more on a personal basis, the difference is negligible for professional use *(2)*.

These results seem to suggest a community-wide need for academic-oriented social networking sites, a need acknowledged by the academic world. And in fact, several social-networking sites specifically for scientists already exist (see box).

Lonely pursuit?

However, none of these sites yet seems to have captured the interest of a significant proportion of the scientific community, although this could also be because researchers are unwilling to discuss their work openly. Research in progress is less likely to be publicly discussed, regardless of how useful input could be, for fear of having ideas and results stolen by other research teams. It may also be a simple matter of time; as younger researchers who have grown up using the internet rise up the ranks, usage is likely to grow.

Perhaps academics will be more impressed by upcoming project VIVO, an open-source software platform developed at Cornell in 2003. VIVO is a research-discovery tool that delivers public data about topics and researchers, and aims to bridge the gap between social networking and science. Time will tell if these types of initiatives will eventually manage to fill the gap in the academic social-networking market.

Where scientists network

• **Academia.edu:** nicknamed the "FaceBook for scientists" and claiming to help academics answer the question: who's researching what?

• **BioMedExperts.com:** an online community for biomedical researchers which claims to analyze the profiles of more than 1.8 million scientists.

• **Epernicus:** founded in 2008, Epernicus claims to be "The shortest path to people and expertise in your scientific network".

• **Laboratree:** developed by Indiana University, Laboratree is both a social-networking site for scientists and a research-management tool.

• **ResearchGate:** launched nearly two years ago, it now claims to have more than 250,000 members.

• **ResearchPages:** a project-focused site for researchers, which has been live for a few years.

• **Scilink:** dubbed the "LinkedIn for scientists", Scilink is said to have mined over 104 million relationships from the literature, and to have more than 40,000 users.

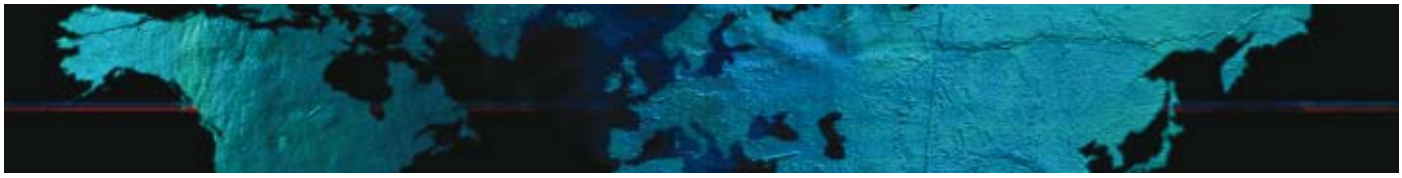
References

(1) Nielsen//Netratings (2006) "Social networking sites grow 47 percent, year over year, reaching 45 percent of web users", Press Release.

(2) Crotty, D. (2010) "Science and Web 2.0: Talking About Science vs. Doing Science", *Scholarly Kitchen.*

(3) Brynko, B. (2010) "Viva VIVO: Let the Networking Begin", *Information Today* – Medford.

Country trends



An international start to a high-flying academic career

JUDITH KAMALSKI

One piece of advice regularly given to young researchers trying to move up the career ladder is to spend time doing research abroad, either within their graduate training or as a post-doc. However, in 2007, only 2.2% of US-born new science doctoral recipients "had definite plans to go abroad for work or study" *(1)*. Apparently, research abroad is not popular with young American researchers.

My own experience in the Netherlands confirms this observation: many people stayed at the same university throughout their career, receiving their undergraduate and postgraduate training, and hoping to get tenure, without leaving town.

Broaden and improve your mind

One reason to work in a lab or team abroad is to learn different approaches to conducting research *(1)*. Admittedly, this can be achieved by simply working at a different university within the same country but moving abroad is a further step, taking this experience to a whole new level. A different hierarchy, new language, alternative methodologies, unusual habits, strange working hours, particular writing styles, to mention but a few, all take some getting used to, and it is exactly this kind of flexibility that adds value to your CV.

HR representatives actively seek candidates with international experience, and the cross-cultural communication ability, analytical skills, appreciation of cultural contexts, adaptability to new circumstances and differences, developed worldview, independence and self-confidence this brings *(2)*.

Moving abroad could also benefit your academic work. Scientific research has shown that the experience of living outside your home country and adapting to a new culture can enhance creative thinking *(3)*. William Maddux says: "Knowing that experiences abroad are critical for creative output makes study abroad programs and job assignments in other countries that much more important, especially for people and companies that put a premium on creativity and innovation to stay competitive." *(4)*

Meeting collaborative partners

Another reason to take part in research projects abroad is to promote international collaboration. The Dutch Organization for Scientific Research (NWO) says: "Science is a champion's league. [...] Holding the lead requires working together and searching out the competition." *(5)* Contacts made during international research placements can lead to collaborations and co-publications in future studies *(6)*.

Just like in many other professional careers, international experience can help make you more visible among other candidates and can present opportunities for collaboration that may never have occurred at your home university.

It is, however, vital to maintain communications and contact with colleagues in your target network, at the university where you would like to end up eventually. It is not only what you know but also who you know, so the most important thing you can do is to build and maintain your networks, at home and abroad.

Watch your profile

For researchers who do take the leap into new territories, it is worth keeping in mind that publishing under different affiliations could give you different author profiles in databases, which could affect future evaluations performed by others. This is can be maintained in Scopus, for instance, by using the feedback button on the Author Details page.

Useful links:

Considering Reasons To Study Abroad for Dummies

References
(1) Laursen, L. (2009) "The Ups and Downs of Doing a Postdoc in Europe", *Science Career Magazine*.
(2) **Considering Reasons To Study Abroad for Dummies**
(3) Maddux, W.M. & Galinsky, D. (2009) "Cultural Borders and Mental Barriers: The Relationship Between Living Abroad and Creativity", *Journal of Personality and Social Psychology*, Vol. 96, No. 5.
(4) **Maddux, W.M. (2009) Living Outside the Box: New Evidence Shows Going Abroad Linked to Creativity, American Psychological Association (APA) Press Release.**
(5) **Netherlands Organisation for Scientific Research (NWO), NWO seeks strong alliances worldwide.**
(6) Melin, G (2004) "Postdoc abroad: inherited scientific contacts or establishment of new networks?", *Research Evaluation*, volume 13, number 2, pp. 95–102.

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Expert opinion

Secrets of early success

MICHELLE PIROTTA

Getting an academic career off the ground can be a daunting challenge, involving a lot of hard work. We speak to six successful early-career researchers from the UK/US, Poland and India about their work ethic, and how they and others measure their performance.

UK and US

Using Scopus data, Research Trends identified the top-five prolific and cited Iranian universities and institutes in 2007 (see Tables 1 and 2 respectively).

Susanna Atwell, Post-Doctorate in plant genetics, University of Southern California

First-name author on a paper published in *Nature (1)*

What are the three most important methods you have employed to excel in your career?

I was lucky to get a large project that I knew would generate a lot of data that would be publishable in a good journal and would provide leads to other projects. As a Ph.D. student, this is an invaluable opportunity, as you benefit from support and experience. Collaboration and a good academic grounding are also essential.

How do you measure your own performance?

I don't really have a specific method beyond whether I can sleep at night. I realize I need to publish good papers in good journals, but I don't really watch what other people are doing. I'm only just getting to grips with how competitive this career is, but for now, my only measure of success is whether I think I'm doing good work and to continue to do the very best I can.

How does your institute measure your performance?

It really comes down to how many papers you have as first-name author. I aim to list around three-quarters of my publications where I'm first author, and a quarter where I'm not, as evidence of collaboration. It's also important to get publications in big-name journals, but I want a good spread in specialist, niche journals, too.

References

(1) Atwell, S. et al (2009) "Genome-wide association study of 107 phenotypes in a common set of Arabidopsis thaliana inbred lines", *Nature*.

INDIA

Dr Tanmay Basak, Professor, Department of Chemical Engineering, Indian Institute of Technology, Madras, India

Winner of the NASI-Scopus Young Scientist Award – National Academy of Science, India, and Elsevier India, 2009

What are the three most important methods you have employed to excel in your career?

Research into mathematical modeling and theoretical research, teaching post-graduates, which enriches my subject area, and exploring new possibilities within chemical engineering.

How do you measure your own performance?

Publishing in scientific journals with high IFs, checking my *h*-index (which is currently 12 in Scopus) and generally counting my citations and publications.

How does your institute measure your performance?

Quantitatively: by the quality of publications and the citations received.

How does winning awards help you in your career?

Awards help you to get into good publications, and at award events you have the opportunity to network with leading scientists in the field. Awards also help you to inspire others.

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POLAND

Aneta Kurzepa, Ph.D. candidate, Institute of Immunology and Experimental Therapy, Polish Academy of Sciences
Winner of the Elsevier-Perspektywy Young Researcher Award 2009

Lukasz A. Malek MD Ph.D., resident in cardiology,
Institute of Cardiology, Warsaw, Poland
Winner of the Elsevier-Perspektywy Young Researcher Award 2009

Maciej Misiorny, Ph.D. student,
Faculty of Physics,
Adam Mickiewicz University
Winner of the Elsevier-Perspektywy Young Researcher Award 2009

Dr Krzysztof Cichy, Assistant Professor, Faculty of Physics, Poznan University of Economics
Winner of the Elsevier-Perspektywy Young Researcher Award 2009

What are the three most important methods you have employed to excel in your career?
Diligence, obstinacy and passion. The only way to achieve success is by loving what you do and not losing heart when you meet difficulties. (Aneta Kurzepa)

How do you measure your own performance?
Through feedback from my tutors, publications, citations and awards. (Lukasz A. Malek)

How does your institute measure your performance?
My institute mainly takes publications and participation at conferences into account. More points are awarded if you publish in journals that score well on the Ministry of Science and Higher Education's official list. (Maciej Misiorny)

How does winning awards help you in your career?
First of all, it convinces me that I am doing good research. It also helps support my career both within my own institute and in attracting financial assistance. (Krzysztof Cichy)

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People Focus

The importance of inspirational researchers

ANDREW PLUME

Ask any researcher how they started out, and they will often say it was thanks to a unique individual who inspired them to pursue a career in science. Indeed, the banquet speeches of Nobel Laureates are typically peppered with references to their mentors. Research Trends asked our successful early-career researchers featured in the previous article one more question: which researcher has inspired you most in your career, and why?

Professor Józef Barnaś

"I'm quite sure my supervisor would laugh if I called him 'inspiring', but the truth is, through his great passion for science, he has shown me what it means to be a real scientist." – Maciej Misiorny, Ph.D. student, Faculty of Physics, Adam Mickiewicz University, Poland.

Professor Józef Barnaś at the Faculty of Physics, Adam Mickiewicz University and the Institute of Molecular Physics, Polish Academy of Sciences, Poznan, Poland, is the author of more than 200 articles and conference papers published in international journals. In the late 1980s, Prof. Barnaś was part of the team that proposed the Camley-Barnaś semiclassical transport model that provided the theoretical underpinnings of giant magnetoresistance (GMR), a quantum effect exploited for the production of ever-smaller hard disk drives in laptops and mobile music players. The simultaneous and independent discovery of GMR by Albert Fert and Peter Grünberg in 1988 was recognized by the joint award of the Nobel Prize in Physics for 2007. Both awardees noted Barnas's contribution to their work in their Nobel autobiographies.

Associate Professor Zofia Bilinska

"My tutor inspires me and leads my career. She has put huge effort into helping young researchers and giving them the opportunity to develop their ideas." – Lukasz A. Malek, MD Ph.D., resident in cardiology, Institute of Cardiology, Warsaw, Poland.

Associate Professor Zofia Bilinska is an expert in myocardial and pericardial diseases. As Deputy Director for Science at the Institute of Cardiology, Warsaw, Poland, she has published more than 60 articles since the mid-1980s; about half of these have been published in English and the remainder in Polish. Bilinska's co-authorship on a 2008 position statement from the European Society of Cardiology on classification on heart muscle diseases (cardiomyopathies) constitutes her top-cited work to date, with more than 80 citations so far.

Professor Andrzej Gorski

"My doctoral thesis advisor is a man of great knowledge and scientific passion, and has always supported my work." – Aneta Kurzepa, Ph.D. candidate, Institute of Immunology and Experimental Therapy, Polish Academy of Sciences.

Professor Andrzej Gorski is an internal medicine specialist at the Institute of Immunology and Experimental Therapy, Polish Academy of Sciences, Warsaw. With more than 300 journal publications in clinical immunology and transplantation since 1969, Prof. Gorski has collaborated with more than 100 co-authors over the length of his career. He is editor-in-chief of Archivum Immunologiae et Therapiae Experimentalis and is a pioneer in the developing field of bacteriophage therapy for the treatment of infections in humans.

Dr Elaine Ostrander

"I was inspired by the way she presented her ideas on association mapping in dogs, which helped me understand how to arrange my own ideas on association mapping in plants." – Susanna Atwell, Post-Doctorate in plant genetics, University of Southern California.

Dr Elaine Ostrander, Chief, Cancer Genetics Branch, National Human Genome Research Institute, National Institutes of Health, Bethesda, Maryland, USA, heads a lab mapping genes responsible for cancer susceptibility in dogs and humans. Many canine cancers appear to be very similar

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to their human counterparts, such that comparative studies of canine and human cancer genetics could lead to important clinical outcomes for both species. Ostrander's research hit the headlines in 2007 when she and her team showed that most of the variation in body size of domestic dogs is due to differences in a single gene encoding a growth-promoting protein. Ostrander has an h-index of 41, and her 169 published papers have been cited a total of 3,614 times since 1996 (including more than 450 citations to the 2005 paper she co-authored describing the genome sequence of the domestic dog).

Professor Adrian Bejan

"Many of my research publications are based on Professor Bejan's ideas. His publication record, which includes the most publications and citations in the field of heat transfer, and the originality of his research have inspired me to pursue fundamental research." – Dr Tanmay Basak, Professor, Department of Chemical Engineering, Indian Institute of Technology, Madras, India.

Professor Adrian Bejan (Duke University, Durham, North Carolina, USA) is a mechanical engineer and inventor of the constructal theory of design in nature, which stresses that patterns and geometries found in nature are a result of fundamental physical phenomena. Prof. Bejan's more than 430 publications in international journals have been cited more than 3,140 times since 1996, making him one of the most highly cited engineering researchers globally, a fact also noted in an article published in the December 2008 issues of International Journal of Heat and Mass Transfer in honor of his 60th birthday.

Professor Karl Jansen and Dr Gregorio Herdoiza

Karl Jansen

Gregorio Herdoiza

"Discussions and work with them have helped me to learn a lot in a rather difficult field of physics." – Dr Krzysztof Cichy, Assistant Professor, Faculty of Physics, Poznan University of Economics.

Professor Karl Jansen and Dr Gregorio Herdoiza at the NIC Research Group Elementary Particles at Deutsches Elektronen-Synchrotron (DESY) in Zeuthen, Germany, conduct sophisticated research into the very structure of matter.

Using high-energy accelerators and detectors for photon science and particle physics, they delve into the realm of the sub-atomic world to gather insights on the nature of the universe. With almost 150 publications in the journal literature, Prof. Jansen's work has been cited more than 1,200 times since 1996. Actively publishing since 2001, Dr Herdoiza has maintained an impressive authorship rate of at least one article each year. His best-cited work to date, cited 34 times since publication in 2007, was on "dynamical twisted mass fermions with light quarks", and was co-authored with Prof. Jansen.

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Andrzej Gorski: Piotr KieraciÐski, "Forum Akademickie", Poland
Adrian Bejan: Duke University

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