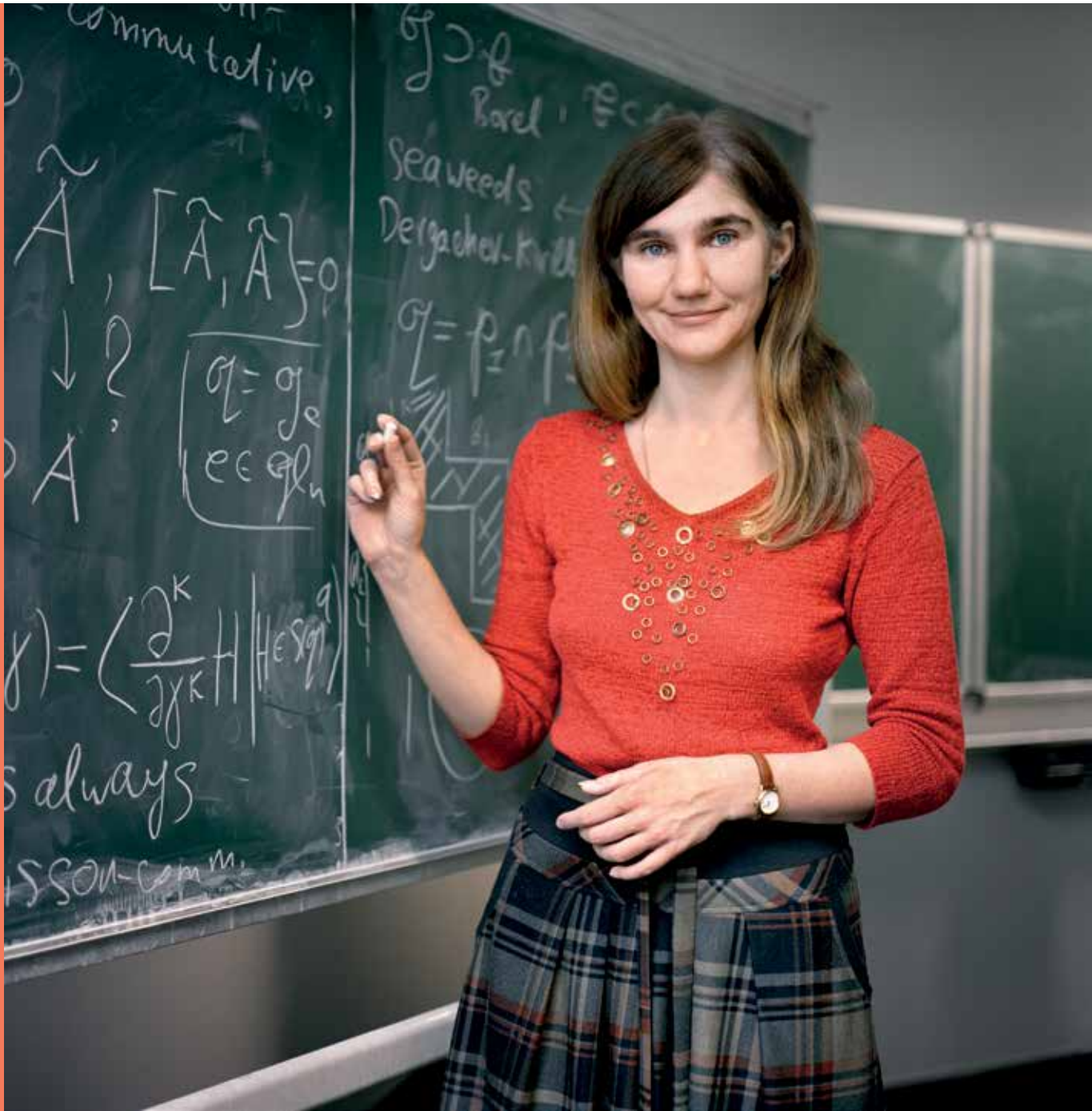


Oksana Yakimova

$$chV_{\lambda} = \frac{\sum_{w \in W} \varepsilon(w) e^{w(\lambda + \rho)}}{\prod_{\alpha \in \Delta^+} (e^{\alpha/2} - e^{-\alpha/2})}$$

Oksana Yakimova was born in Moscow. She studied Mathematics at the Moscow State University and obtained a PhD in Mathematics under the supervision of Prof. Ernest Winberg both in Moscow and at the Rheinische Friedrich-Wilhelms-Universität in Bonn, where she moved to in 2005. In her thesis, she classified Gelfand pairs. She was later a postdoc at the University of Köln and at the Friedrich-Alexander University of Erlangen-Nürnberg. In 2011 she was appointed Juniorprofessor at the University of Jena.

- Research topics:
- Algebraic groups and Lie algebras
 - Poisson structures
 - Harmonic analysis on Gelfand pairs

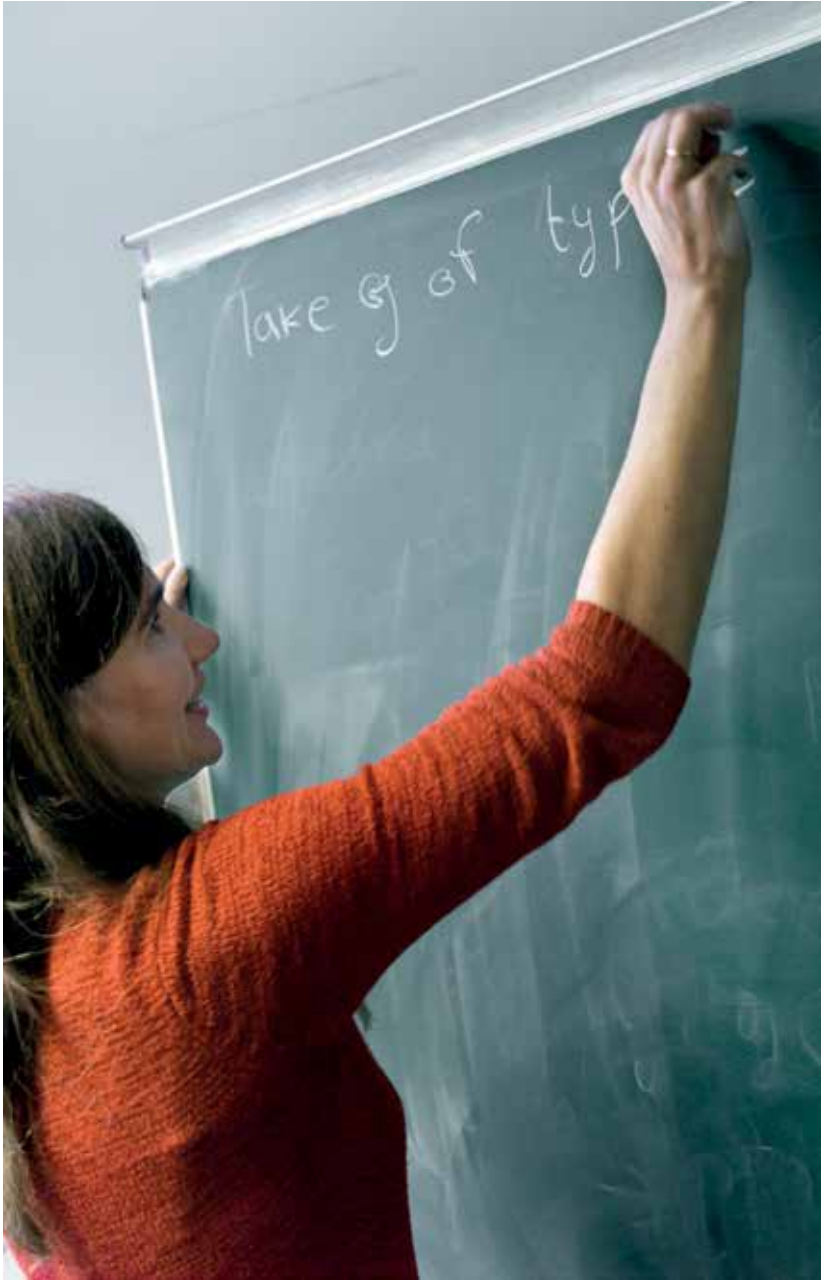


Jena, Germany, 2015

How and when
did you choose to
do mathematics?

I come from Moscow, and as a child I would spend my summers at my grandparents' in a village in Ukraine some 24 hours away from Moscow by train. They were school-teachers (my grandmother passed away and my grandfather retired long ago) and I used to enjoy doing embroidery with my grandmother. My grandfather had many books. I must have been some 8 or 9 years old when amongst them I found a big book with mathematical quizzes such as this one, which I still recall: How do you take a wolf, a goat and a cabbage across a river to the other bank, without any of them disappearing, knowing that the wolf eats the goat and the goat eats the cabbage but the wolf does not eat the cabbage?

I adored this book and solved the problem; I recall you needed to cross the river quite a few times! In the 7th or 8th grade (I must have been around 12 or 13 years old), my parents, both chemists working at research institutes in Moscow, seeing that I was so interested in mathematics, would take me on Saturday afternoons to classes delivered at Moscow State University for school children. There, we would see more sophisticated mathe-



matics than we had at school, involving combinatorics, the induction principle for example. In the eighth grade, I was then 13 years old, I took part in some competitions in which I did surprisingly well. At the age of 16, I went to China in order to take part in the mathematical Olympic games for school children as a member of the Russian team; six of us from Kazan, Moscow, and Saint Petersburg, went to Tian Jin in this Olympic exchange program. None of us got the first prize, as far as I remember.

At the age of 13, I changed schools for the third time to attend a special class for children gifted in mathematics and physics, then a year later, I changed to one of the best special schools in Moscow where I remained from September 1993 to May 1996. There were four girls in the class of 19, which later dropped down to 15 since some people left and one was expelled because he was not doing well enough. I enjoyed this school a lot; we had very intensive teaching, six days a week with six lessons a day, comprising algebra (4 lessons a week), geometry (2 lessons a week) and analysis (3 lessons a week). At that time I had no doubts I wanted to do mathematics, but now with the uncertainty of my professional future in mind, I am not as self-confident anymore.



Were you then encouraged by your family, friends or by other people around you?

My parents had me enrolled at the special school for mathematics and took me to the classes at university when I was still a school girl, but they would have rather I studied chemistry, their subject. My mother has a PhD in chemistry and has written various research articles. She recently lost her job at the research institute where she was working, and is now working for a private clinic. My father has a diploma in chemistry and is still working at a research institute in Moscow. Chemistry is different from mathematics, in that it essentially relies on experiments. At my first school, I must have been around ten years old, a female teacher spotted me and was pleased when I answered her questions. She herself was frustrated to be working as a school teacher, since she had a diploma in mathematics from the Lomonosov University in Moscow. She could therefore not provide a very positive answer to my question, "what can one do with mathematics"?



Did you come across obstacles in pursuing your career as a mathematician?

The special school I went to, school number 57, tends to produce "intellectual snobs", as one may be tempted to call us. And definitely this is how we were looked upon as students at the Moscow State University. It was a shock for me to be treated by the administration of the university in a very soviet manner. For example, they would address us with the familiar "ty" form instead of the more formal "Vy" form we had been used to in the special school. I did not feel as respected as I had been as a school pupil. I took two diploma exams in parallel (in 2001), one at Lomonosov University and one at the Independent University, both of which required writing a small thesis. At the end of the second year, when you are supposed to find an advisor, I went to Vinberg. There was not much choice then, for people like Gelfand and Kirillov had left. I liked Vinberg and attended his course intended for third year students. I liked him as a person and appreciated his style. He was very well organised, taught in an interesting way, and was always formally dressed. He looked the way a professor should look! I am still in touch with him and gave a talk at his seminar.

I do not see the fact of being a woman as a problem in my career. But I do have a vivid recollection of a train trip in 1995 with a group of some twenty 9th, 10th and 11th grade pupils (I myself was in the 10th grade) on our way to Saratov, quite far from Moscow, for a mathematical Olympic game. I recall the astonishment on the (female) ticket officer's face when she came up to me, the only girl in the wagon since the students who were accompanying us were also male. I then realised that I indeed was the only girl!

In Germany, there are few women mathematician professors; in Jena out of some 10 members of our algebra group, only one PhD student and myself are women. In Jena, among seventeen full professors in mathematics (including stochastics) there used to be one woman, who has recently retired.

Even though I enjoy collaborating with women, I find it more difficult than with men, since we start talking about other things; starting from mathematics, we can end up talking about flowers! Men are much more focused, no flowers with them!

In retrospect, are you happy to have chosen mathematics or do you have some regrets? For you, what are the joys of mathematics? What are the hardships?

I do not regret, not at all; things I do regret lie outside mathematics. I still enjoy solving mathematical puzzles and in a way I am the same small girl with the big quiz book. I like to find out as much about a mathematical object as possible, just as you might want to understand a person as well as possible. Collaborating with other people is part of the fun; I myself collaborate with people from Italy, England and Hungary. I enjoy inviting people, visiting them, going to conferences. But not yet having a permanent position is a source of worry and an unpleasant situation for me. I cannot project myself into the future, to buy a flat for example is something I cannot do in my situation. I do not think that the fact of being a woman is the source of the problem, even though it is true that usually a man gets the position in spite of the fact that a woman was invited for an interview. Being a Russian woman, which is what I officially am even if I actually feel Ukrainian, is a handicap.

I do not enjoy teaching too much, maybe not at all!

Teaching students seems like a hopeless task to me! Teaching becomes enjoyable when you have students who understand the material, but this is rare since students do not like to think nowadays. When I was young, I thought you had to think to become a mathematician, until I met some PhD students at the Max Planck Institute in Bonn who told me the opposite; a computer program, they claimed, is enough to generate an article. But I believe that everyone needs to think, otherwise life is too boring!

What would you recommend to a young woman in your country wanting to start a career in mathematics?

If she seemed to be hesitant, I would advise her to leave mathematics, to do something else! If you have doubts, just give up; finding a position later is too hard to be worth trying out mathematics if you are not fully convinced from the start. Fighting your way up is too tough if you do not love mathematics. For a Russian woman, it is especially hard. The situation in Russia is somewhat difficult and many mathematicians have already left; the job market abroad is saturated.

Could you write a few lines, in a manner understandable to non-experts, describing your topics of research?

Take any object, and forget its colour. Take this cup for example; I can rotate it and see the same object; it is the same object after rotation. This is a manifestation of a symmetry. A ball has a lot of symmetries, an infinite number, the cup has fewer. Different objects have different symmetries. You can combine two symmetries, implementing two rotations one after the other for example. One says that symmetries form a group. I am trying to understand all the symmetries of a given object and conversely, to recognise an object from the group of its symmetries. The platonic solid I have in my hands for example, has many symmetries, but not infinitely many. Using these symmetries you can reconstruct the solid from one of its vertices. Some quantities, such as the length of an edge, are preserved under some symmetries, such as a rotation. They do not vary and are called invariants. Using the distance as an invariant, you can put the solid inside a sphere. Symmetries are used in physics to describe fundamental particles, which are characterised by their symmetry group.

What is your favourite personal achievement in mathematics?

In my PhD thesis – which I defended at the Max Planck institute in Bonn in 2005 with an MPIM fellowship – I classified Gelfand pairs, which is probably the best result I ever got. Particularly flattering is the fact that Joe Wolf included it in his book “Harmonic analysis on commutative spaces”. I had to consider many special cases, and when I finished the classification, I spent a lot of time looking for an appropriate formulation of the results. More recently, I found a counterexample to a conjecture of Joseph’s concerning symmetric semi-invariants of biparabolics. I was actually trying to prove Premet’s conjecture when I realised that it was not true. By a coincidence, the counterexample disproves Joseph’s conjecture as well!

