

2007 E. H. Moore Prize

The 2007 E. H. Moore Research Article Prize was awarded at the 113th Annual Meeting of the AMS in New Orleans in January 2007.

The prize is awarded every three years for an outstanding research article that appeared in one of the primary AMS research journals: *Journal of the AMS*, *Proceedings of the AMS*, *Transactions of the AMS*, *AMS Memoirs*, *Mathematics of Computation*, *Electronic Journal of Conformal Geometry and Dynamics*, or *Electronic Journal of Representation Theory*. The article must have appeared during the six calendar years ending a full year before the meeting at which the prize is awarded. The prize carries a cash award of US\$5,000.

The prize honors the extensive contributions of E. H. Moore (1862–1932) to the AMS. Moore founded the Chicago section of the AMS, served as the Society's sixth president (1901–1902), delivered the Colloquium Lectures in 1906, and founded and nurtured the *Transactions of the AMS*.

The previous recipient of the Moore Prize is Mark Haiman (2004).

The Moore Prize is awarded by the AMS Council acting on the recommendation of a selection committee. For the 2007 prize, the members of the selection committee were: Lawrence Craig Evans, Carolyn S. Gordon (chair), Grigori A. Margulis, George C. Papanicolaou, and Efim I. Zelmanov.

The 2007 Moore Prize was awarded to IVAN SHESTAKOV and UALBAI UMIRBAEV. The text that follows presents the selection committee's citation, brief biographical sketches, and the awardees' responses upon receiving the prize.

Citation

In two groundbreaking papers published in the *Journal of the American Mathematical Society* ("The tame and the wild automorphisms of

polynomial rings in three variables", **17** (2004), no. 1, 197–227; and "Poisson brackets and two-generated subalgebras of rings of polynomials", **17** (2004), no. 1, 181–196), Ivan Shestakov and Ualbai Umirbaev develop powerful new techniques to address the structure of automorphism groups of polynomial algebras. Their dramatic results include a proof of the longstanding Nagata Conjecture, establishing the existence of a wild automorphism of a polynomial algebra in three variables.

Of particular importance is their novel use of Poisson structures and their universal quantizations to obtain a criterion of tameness. This innovation is already resulting in further major applications.

Biographical Sketch: Ivan Shestakov

Ivan Shestakov was born on August 13, 1947, in the Irkutsk region in Russia. After graduating from the Physical-Mathematical School in Novosibirsk, he entered Novosibirsk University in 1965. There he obtained his first results in algebra, under the guidance of professors K. Zhevlakov and A. Shirshov. His master's thesis "On a Class of Non-commutative Jordan Rings" was awarded the Medal of the Academy of Sciences of USSR for students.

In 1970 Shestakov graduated from Novosibirsk University and entered the Sobolev Institute of Mathematics as a researcher. In 1973 he received his Ph.D. from Novosibirsk University, and in 1978 he earned the Doctor of Sciences from the Sobolev Institute of Mathematics for the work "Free Alternative Algebras". The book *Rings That Are Nearly Associative*, written by Shestakov jointly with K. Zhevlakov, A. Slinko, and A. Shirshov, was published in 1978.

In 1974 Shestakov became a professor of the Novosibirsk State University. Since 1999 he has held the position of full professor at the University of São Paulo.

Shestakov's interests lie in ring theory and combinatorial algebra. He has focused on the structure and representations of nonassociative algebras and superalgebras, PI-algebras, free algebras and their automorphisms.

Response: Ivan Shestakov

It is a great honor for me to receive the E. H. Moore Research Article Prize, and I would like to thank the AMS and the selection committee for awarding this prize. I am especially happy to share it with my former student Ualbai Umirbaev. During my mathematical career, I experienced help and support from my friends and colleagues in different countries. I would also like to use this opportunity to thank all of them, especially my colleagues from the Sobolev Institute of Mathematics, where I grew up as a mathematician, and from the University of São Paulo, where I have been working during the last several years.

Biographical Sketch: Ualbai Umirbaev

Ualbai Umirbaev was born in Turtkul, Shymkent region, Kazakhstan, in 1960. He studied mathematics at Novosibirsk State University. He got his Ph.D. in mathematics from the Sobolev Institute of Mathematics of the Siberian branch of the Soviet Academy of Sciences with Ivan Shestakov in 1986, and from the same Institute he got his Doctor of Science degree in 1995.

During 1986–1995 Umirbaev taught at the Kazakh State University, Almaty, first as an assistant professor, then as a senior lecturer and then as an associate professor. In 1995 he moved to the South-Kazakhstan State University in Shymkent as a full professor and Chair of Informatics. In 2001 Umirbaev moved to the Eurasian National University in the new capital Astana, where he became a professor and Chair of Algebra and Geometry. His main research interests are in the areas of combinatorial algebra, subalgebras and automorphisms of free algebras, and affine algebraic geometry.

Response: Ualbai Umirbaev

I am deeply honored to have been chosen to receive the 2007 E. H. Moore Research Article Prize together with Ivan Shestakov.

It is very interesting to recall that I met the Nagata automorphism for the first time in a survey by Vladimir Popov in 1989. It was really an amazing and a concrete problem! Later I studied two very interesting papers related to the Nagata automorphism: by Hyman Bass in 1984 on non-triangular actions and by Martha Smith in 1989 on stably tame automorphisms. I was studying



Ivan Shestakov



Ualbai Umirbaev

subalgebras of free algebras with a view towards to algorithmic problems. Since then I related these investigations with the study of automorphisms of free algebras.

I am very glad that the two cited papers were published in the *Journal of the American Mathematical Society*. I am very glad that the committee recognized the significance of these results. Many challenging problems of affine algebraic geometry and combinatorial algebra are still open. I hope that the recognition by the Moore Prize will spur further activity in this area.

I would like to thank my friends, colleagues, and collaborators with whom discussions of mathematics were very important and useful. Also I would like to thank my father Utmakhanbet Umirbaev (1922–2001), who was a teacher of mathematics, thanks to whom I started to study math.