

THE
SHAW
PRIZE
邵逸夫獎



2020 The Shaw Prize Lecture

in Mathematical Sciences 2020

presented by Shaw College
The Chinese University of Hong Kong

LIVE

Friday, 21 May 2021 at 7:00 pm
Zoom Live Streaming

Programme

Introduction of speakers

**Professor HE Xuhua, Choh-Ming Li Professor of Mathematics,
Department of Mathematics**

The Chinese University of Hong Kong

Lecture on “**Zeta values and motivic periods**”

Professor Alexander BEILINSON

Lecture on “**Symmetry through the Representation Theory**”

Professor David KAZHDAN

Questions and answers

Moderated by Professor HE Xuhua

The Shaw Prize

The Shaw Prize is an international award to honour individuals who are currently active in their respective fields and who have recently achieved distinguished and significant advances, who have made outstanding contributions in academic and scientific research or applications, or who in other domains have achieved excellence. The award is dedicated to furthering societal progress, enhancing quality of life, and enriching humanity's spiritual civilization. Preference is to be given to individuals whose significant works were recently achieved and who are currently active in their respective fields.

The Shaw Prize, established under the auspices of Mr Run Run Shaw in November 2002, is managed and administered by The Shaw Prize Foundation based in Hong Kong. The Shaw Prize consists of three annual awards: the Prize in Astronomy, the Prize in Life Science and Medicine, and the Prize in Mathematical Sciences. The prizes were first awarded in 2004.

The Shaw Laureates 2020

The Shaw Prize in Astronomy

Professor Roger D BLANDFORD

The Shaw Prize in Life Science and Medicine

Professor Gero MIESENBÖCK

Professor Peter HEGEMANN

Professor Georg NAGEL

The Shaw Prize in Mathematical Sciences

Professor Alexander BEILINSON

Professor David KAZHDAN

Shaw College

Named after its Founding Patron, Shaw College was made possible by the generosity of Sir Run Run Shaw, who donated HK\$110 million to The Chinese University of Hong Kong for the founding of the fourth constituent college.

The ordinance that gives legal effect to this important development of the University was passed by the Legislative Council in July 1986 and became law on 1 August of the same year. The foundation stone of the College campus was laid by Sir Run Run Shaw, the Founding Patron and Sir David Akers-Jones, the then Acting Governor, on 12 January 1987. On 2 March 1990, Shaw College was officially opened by the then Hong Kong Governor, Chancellor of the University, Sir David Wilson and Sir Run Run Shaw.



The motto of the College “修德講學” comes from a saying of Confucius. In Book VII of The Analects of Confucius, the Master said, “It is these things that cause me concern: failure to cultivate virtue; failure to go more deeply into what I have learned; inability, when I am told what is right, to go over to where it is; and inability to reform myself when I have defects.”

It is interesting that the cultivation of virtue and the going more deeply into what one has learned are placed by Confucius at the head of the list of things that caused him concern. The reason is not far to seek. The former concerns one’s moral character, while the latter is the way to new knowledge. A man of sound moral character eager to make new discoveries on the strength of existing knowledge is, in the eyes of Confucius, close to the ideal of the gentleman.

Founding Aspiration

Learning, innovation and benefitting mankind

College Slogan

Excellence with a soul, Leadership with a heart

Founding Patron of the College

The late Sir Run Run Shaw, world renowned philanthropist and movie and television magnate, was the Founding Patron of Shaw College. With his usual generosity and particular concern for the education of the young, in 1986 he made possible the creation of a fourth college at The Chinese University of Hong Kong, promising learning excellence to future generations.



Sir Run Run Shaw

Sir Run Run was Executive Chairman of two of Hong Kong's most successful entertainment and media listed public companies: Shaw Brothers (HK) Limited and Television Broadcasts Limited (TVB). His contribution to the entertainment industry is legendary, as is his generosity towards education and the arts.

Sir Run Run began his close association with the Chinese University in 1967 when he became a Member of the Board of Trustees of United College. Later, he served as a Member of the University Council and Chairman of United College for many years. In March 1992, he was appointed as a Life Member of the University Council and Permanent Honorary Chairman of United College.

Widely acclaimed for his long years of community service, Sir Run Run received international awards from several countries, including the United Kingdom, Belgium and France, and in July 1998 was awarded Hong Kong's highest honour the Grand Bauhinia Medal by the HKSAR Government. Moreover, he received honorary doctorate degrees from the UK and the USA, and nearer to home from China, Macau and Hong Kong. A staunch advocate for the Hong Kong Red Cross, he served as President for over twenty-six years and in 1998 became Vice Patron.

In his later years, Sir Run Run resolved to use his modest influence in the global advancement of knowledge and research and together with his wife, the late Mrs Mona Shaw, established the Shaw Prize to recognize imaginative individuals who have contributed to furthering societal progress, enhancing quality of life, and enriching humanity's spiritual civilization. The Shaw Prize continues to move forward under the direction of the Shaw Prize Foundation.

Lecture Synopsis

“Zeta values and motivic periods”

- **Professor Alexander BEILINSON**

For an arithmetic scheme X its zeta function $\zeta_X(s)$ encodes the numbers of points of X with values in all finite fields. The values of ζ_X at integral s are conjecturally related to important global invariants of X - its motivic periods. (If X were human, these conjectures would derive X 's looks from the chemical contents of the body.) The conjectures are widely open. I will try to explain informally the ideas that led to their formulation back in the 1980s and, time permitted, give an example. No previous knowledge of the subject is assumed.

Biography

Professor Alexander BEILINSON

Professor Alexander Beilinson was born in 1957 in Moscow, Russia and is currently the David and Mary Winton Green University Professor at the University of Chicago, USA. He obtained his PhD in 1988 from the Landau Institute of Theoretical Physics, Russia. He was a Researcher at the Landau Institute (1987–1993) and a Professor at the Massachusetts Institute of Technology, USA (1988–1998) before moving to his present position.



Lecture Synopsis

“Symmetry through the Representation Theory”

- **Professor David KAZHDAN**

Representation theory exploits symmetries of mathematical and physical structures that could be hidden. Often they are revealed through unexpected connections with other areas of Mathematics such as group theory, functional analysis, topology, algebraic geometry, category theory and even mathematical logic. In my talk, I will present some of such connections.

Biography

Professor David KAZHDAN

Professor David Kazhdan was born in 1946 in Moscow, Russia and is currently Professor of Mathematics at the Hebrew University of Jerusalem, Israel. He received a diploma in 1967 and earned his PhD under Alexandre Kirillov in 1969 from Moscow State University, Russia. After working at Moscow State University as a Researcher (1969–1975), he emigrated to USA to take up a position at



Harvard University, where he was successively Visiting Professor (1975–1977), Professor (1977–2002) and Professor Emeritus of Mathematics (2002–). He then emigrated to Israel and has been Professor at the Hebrew University of Jerusalem since 2002. He is a member of the US National Academy of Sciences and the American Academy of Arts and Sciences.

The Shaw Prize Lectures

held at

Shaw College, The Chinese University of Hong Kong

Year	Name of Laureate(s)	Award Category	Lecture Title
2019	Professor Maria JASIN	Life Science and Medicine	Genome Modification by Natural and Artificial DNA Breaks
2018	Dr. Jean-Loup PUGET	Astronomy	Space observations of the Cosmic Backgrounds from Infrared to Microwave and Their Implications for Galaxy Evolution and Cosmology
2017	Professor Claire VOISIN	Mathematical Sciences	Projective Geometry, Kähler Geometry and Hodge Theory
	Professor János KOLLÁR		Circles and Algebraic Surfaces

Year	Name of Laureate(s)	Award Category	Lecture Title
2016	Professor Adrian P BIRD	Life Science and Medicine	From DNA Methylation to Brain Function
	Professor Huda Y ZOGHBI		Rett Syndrome : From the Clinic to Genomes, Epigenomes, and Neural Circuits
2015	Mr. William J BORUCKI	Astronomy	Kepler Space Mission: A Step in the Search for Life in our Galaxy
2014	Professor George LUSZTIG	Mathematical Sciences	Algebraic and Geometric Methods in Representation Theory
2013	Professor Jeffrey C HALL	Life Science and Medicine	Everybody's a Dreamer, and Everybody's a Star
	Professor Michael ROSBASH		The Circadian Feedback Loop: Twenty Years and Counting
	Professor Michael W YOUNG		Genes Controlling Sleep and Circadian Rhythms

Year	Name of Laureate(s)	Award Category	Lecture Title
2012	Professor Jane LUU	Astronomy	Expanding the Solar System: The Kuiper Belt Discovery
	Professor David C JEWITT		Kuiper Belt: What We Know and What We Don't
2011	Professor Demetrios CHRISTODOULOU	Mathematical Sciences	Spacetime Geometry and the Einstein Equations*
	Professor Richard S HAMILTON		Hot Geometry*
2010	Professor David JULIUS	Life Science and Medicine	From Peppers to Peppermints: Natural Products as Probes of the Pain Pathway
2009	Professor Frank H SHU	Astronomy	The Formation of Stars and Planetary Systems

* Lecture was cancelled due to the hoisting of Typhoon Warning Signal No.8.

Year	Name of Laureate(s)	Award Category	Lecture Title
2008	Professor Vladimir ARNOLD	Mathematical Sciences	Mathematics of Chaos
	Professor Ludwig FADDEEV		What is Quantum Mathematical Physics
2007	Professor Robert LEFKOWITZ	Life Science and Medicine	Seven Transmembrane Receptors
2006	Professor Saul PERLMUTTER	Astronomy	Dark Energy and the Accelerating Universe: Past, Present and Future
	Professor Adam RIESS		
	Professor Brian SCHMIDT		
2005	Professor Andrew J WILES	Mathematical Sciences	Solving Equations
2004	Professor P James E PEEBLES	Astronomy	The Discovery of The Expanding Universe

The background of the page is a light blue gradient. In the lower half, there is a dense field of 3D-rendered numbers (0-9) in white and light blue, scattered across the surface. The numbers are of varying sizes and orientations, creating a sense of depth and movement. The top half of the page is mostly blank, with a very light blue gradient.

Shaw College, The Chinese University of Hong Kong

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