Crossing Numbers: From Art and Circuit Design to Knots and Number Theory

Bojan Mohar
Simon Fraser University / IMFM
mohar@sfu.ca

In 1864, Sylvester asked what is the probability that four randomly chosen points in the plane form a convex quadrilateral. During World War II, Paul Turán asked about an optimal design of railroads connecting \( n \) factories with \( m \) warehouses. In 1950s, the British painter Anthony Hill asked how to draw a network of \( n \) interconnected nodes with fewest number of crossings. All these questions are still unresolved. The speaker will overview mathematical foundations of the common theme — the theory of crossing numbers of graphs — and will show some surprising relations with other branches of mathematics.