

The Airy Function: From Coffee Cups to Rainbows to Quantum Wavefunctions

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Abstract: In this talk, we will explore the mathematics of caustics and turning points, starting with a pattern appearing in coffee cups so familiar that most of us are hardly aware of it. A similar phenomenon is responsible for rainbows; although everyone has heard the “raindrops are prisms” explanation of the banding of rainbows, actually modeling the banding turns out to be a subtle business and involves the famous Airy function. The Airy function has turned out to be useful in unexpected places, for example in approximating solutions to the Schrödinger equation. We will explore each of these ideas and trace the mathematical story of the Airy function from its humble beginnings in the theory of ordinary differential equations to the modern mathematics of semiclassical analysis and differential geometry.