Michigan Math Club

Thursday at 4pm in EH1360
Pizza + pop outside afterwards!!

Rays, waves, and caustics

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If you look down at a cup of tea next to a bright light source, you will likely see an example of a caustic: A brightly lit region that follows a sharp curve, with a cusp in the middle. This is created by light being reflected by the interior of the cup onto the surface of the liquid. There are many other examples of caustics in everyday life. In this talk we will study mathematically how such curves arise. We will consider two models for light: rays and waves. To explain the phenomenon using rays will lead us to interesting differential geometry; to explain it using waves we will need to look at oscillatory sums or oscillatory integrals. These two models can be related to each other, using a theorem called "the method of stationary phase".