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**Steve Zelditch\***, Northwestern University, Evanston, IL 60208. *Chaotic billiards and vibrations of drums.*

There are two ways to ‘play’ on a drum, which we allow to be shaped in any way, for instance as a standard circular drum-head, or as a stadium-shaped drum-head. First, one may play billiards on it, shooting a ball in a straight line that bounces off the sides by the law of equal angles. For a circular drum-head the billiard trajectories are completely predictable, but for the stadium-shaped drum they are chaotic and unpredictable. Second, the drum-head may vibrate in one of its normal modes. To visualize these modes, one sprinkles sand on the drum and watches the sand accumulate on the nodal set, where the drum is not vibrating (Chladni). My talk is concerned with the question, how are billiard trajectories related to nodal lines? What do the nodal lines look like as the frequency of vibration tends to infinity? In particular, what happens if the billiards are ‘chaotic’. (Received September 14, 2015)