H.4 Ray splitting billiard

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Use as the Poincaré section the boundary between the two media

1. Find Newtonian dynamics using $k_y = k'_y$; derive Snell's law $\sin\beta = \sqrt{1 - v_0/E}$
2. construct the algorithm for determining periodic orbits by minimizing the action; compute a set of short cycles for ?? value of the parameter ??
3. pruning: consider what happens to some simple trajectories as one varies the parameter ?? from 1 (homogeneous disk) to ∞ (reflection only)
4. compute the Jacobian matrix for rays (not in the literature). It is a product of 3 kinds of terms; free propagation, reflection, refraction
5. include quantum mechanics