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Does a billiard orbit determine its (polygonal) table?

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(joint work with Serge Troubetzkoy)

We consider a billiard transformation $T\colon\ V_P \subset \delta P \times [-\frac{\pi}{2}, \frac{\pi}{2}] \to V_P$, where P is a polygon. We say that two polygons P, Q *are related* if there are points $u_0 \in V_P$, $v_0 \in V_Q$ such that (π_1 is the first natural projection)

- $\overline{\{\pi_1(T^n(u_0))\}}_{n\geq 0} = \delta P$, $\overline{\{\pi_1(S^n(v_0))\}}_{n\geq 0} = \delta Q$,
- the sequences $\{\pi_1(T^n(u_0))\}_{n\geq 0}$, $\{\pi_1(S^n(v_0))\}_{n\geq 0}$ have the same combinatorial order.

In this talk we will present several results on related polygons.