

Periodic trajectories of billiard systems within an ellipsoid in the space of arbitrary finite dimension are considered. Using the algebro-geometric integration procedure of the elliptical billiard, it is proved that periodicity of billiard trajectories is equivalent to the condition that certain point on the Jacobian variety of the isospectral curve is of the finite order. Based on this, the analytical condition for periodicity of billiard trajectories is established. The results are joint with Vladimir Dragović.