

Algebraic non-integrability of magnetic billiards on the sphere and hyperbolic plane

Misha Bialy¹ and Andrey E. Mironov²

¹School of Mathematical Sciences, Raymond and Beverly Sackler Faculty of Exact Sciences, Tel Aviv University, Israel, bialy@post.tau.ac.il

²Sobolev Institute of Mathematics, 4 Acad. Koptyug avenue, 630090, Novosibirsk, Russia and Novosibirsk State University, Pirogova st 1, 630090, Novosibirsk, Russia, mironov@math.nsc.ru

We consider billiard ball motion in a convex domain on a constant curvature surface influenced by the constant magnetic field. We examine the existence of integral of motion which is polynomial in velocities. We prove that if such an integral exists then the boundary curve of the domain determines an algebraic curve in \mathbf{C}^3 which must be nonsingular. Using this fact we deduce that for any domain different from round disc for all but finitely many values of the magnitude of the magnetic field billiard motion does not have Polynomial in velocities integral of motion.