



Centro de **Matemática**
Universidade do Porto

Geometry, Topology and Dynamical Systems Joint Seminar

Date. March 22, 14h30

Place. Room **M004**

Speaker. Alexander Plakhov¹ (University of Aveiro)

Title. Invisibility and retro-reflection in billiards

Abstract. We consider the problem of invisibility for bodies with mirror surface within the scope of geometrical optics. The problem amounts to studying billiards in the exterior of bounded regions. Examples of bodies invisible in 1, 2, and 3 directions and bodies invisible from 1 and 2 points are provided in the talk. It is proved that there do not exist bodies invisible in *all* directions. The question of maximum number of directions and/or points of invisibility of a body remains open. The duality between invisibility (unperturbed billiard trajectories outside a bounded domain) and periodic billiard trajectories inside the domain is also discussed. Further, we consider retro-reflecting bodies with mirror surface. A body is called a *perfect retroreflector*, if the direction of any beam of light incident on it is changed to the opposite. We provide several examples of asymptotically retro-reflecting sequences of bodies. On the other hand, it is not known if there exist perfect billiard retroreflectors.

Remark. Coffee with the speaker is served after the talk (15h30 - 16h00)

¹Alexander Plakhov is currently Invited Assistant Professor with aggregation at University of Aveiro. He obtained the M.Sc. (1981) and the Ph.D. (1986) degrees in Mathematics at the Moscow State University, Russia. Before the current position, Plakhov had some research positions in Moscow and Lisbon, as well as some teaching experience at universities in Moscow and Rio de Janeiro. Plakhov also does refereeing work for a large number of scientific journals. He has given a great contribution to the development of the dynamical systems area with the publication of several scientific papers. Plakhov's homepage is <http://www2.mat.ua.pt/plakhov/>.