

**Alexei Penskoï**

*Isoperimetric inequality for the second non-zero eigenvalue and new bounds on multiplicities of eigenvalues of the Laplace-Beltrami operator on the real projective plane*

**Abstract**

The first subject of this talk is an isoperimetric inequality for the second non-zero eigenvalue of the Laplace-Beltrami operator on the real projective plane (based on a joint paper with N. Nadirashvili). For a metric of area 1 this eigenvalue is not greater than  $20\pi$ . This value could be attained as a limit on a sequence of metrics of area 1 on the projective plane converging to a singular metric on the projective plane and the sphere with standard metrics touching in a point such that the ratio of the areas of the projective plane and the sphere is 3:2.

In order to prove this isoperimetric inequality it was also proven that the multiplicity of the second non-zero eigenvalue on the projective plane is at most 6. This bound on multiplicity was generalized for all eigenvalues with even number on the real projective plane, and this is the second subject of this talk (based on a joint paper with A. Berdnikov and N. Nadirashvili).