

Abstracts of the June 15, 2018 session of the Paris-London Analysis Seminar

Luc Hillairet (Université d'Orléans),

Multiple geometric diffractions at conical points.

Abstract. We study the wave propagation on flat surfaces with conical singularities. After hitting a conical point, the singularities of the wave decompose into two parts : the direct and the diffracted front. These two fronts intersect along two diffractive rays that are limits of non-diffractive ones and are called geometric diffractive rays. With Andrew Hassell and Austin Ford, we propose a new construction of the propagator near these rays. This new description is well adapted to then studying multiple geometric diffractions (when a geometric diffractive ray hits again a conical point) and eventually the contribution to the wave-trace of any kind of periodic diffractive orbit.

Ari Laptev (Imperial College London),

Spectral properties of some functional-difference operators for mirror curves.

Abstract.

Galina Perelman (Universit Paris 12),

Blow up dynamics for the hyperbolic vanishing mean curvature flow of surfaces asymptotic to Simons cone.

Abstract. We consider the hyperbolic vanishing mean curvature flow of surfaces in \mathbb{R}^8 asymptotic at infinity to Simons cone:

$$C_4 = \left\{ X = (x_1, \dots, x_8) \in \mathbb{R}^8, x_1^2 + \dots + x_4^2 = x_5^2 + \dots + x_8^2 \right\}.$$

We show that the flow admits finite time blow up solutions $(\Gamma(t))_{0 < t \leq T}$ that blow up by concentration of the stationary profile: there exists a smooth minimal surface M asymptotic at infinity to Simons cone such that

$$\Gamma(t) \sim t^{\nu+1} M, \text{ as } t \rightarrow 0,$$

where ν is an arbitrary large positive number.

This is a joint work with Hajer Bahouri and Alaa Marachli.

Alexander Strohmaier (University of Leeds),

Local and global index for Dirac operators on Lorentzian spacetimes.

Abstract. I will review some recent results on index theory for the Lorentzian Dirac operator on a globally hyperbolic spacetime. I will show how such index theorems can be derived from Lorentzian versions of the local index theorem and I will explain some essential differences to the Riemannian setting. In particular local elliptic theory is replaced by global propagation of singularity estimates. (joint work with C. Baer)