

Title of the poster: **“New methods to analyse signals defined on spheres”**.

Description:

From a scientific point of view, this theme is extremely interesting. Geologists and astrophysics, for example, need to study signals defined on a sphere, maybe the most famous is the so called ‘Cosmic Microwave Background Radiation’. The problem is that, in this moment, there are very few tools to analyse such data and none of them has a focus on oscillatory behaviours.

The main idea of this project is to extend the Iterative Filtering technique to signals defined on spheres. Iterative Filtering is a technique which permits to study a signal through its decomposition in oscillatory components. To obtain this result we convolve, in an iterative way, the signal with another function called filter. Obviously the shape and size of the filter have a strong impact on the decomposition but, since we use the convolution, it is possible to have some strong knowledge of the obtained functions. However, there is not a unique definition of convolution for functions defined on spheres, because of the topological properties of \mathcal{S}^2 . So in our team we are trying to extend this method in two different ways. The more simple idea is to define new methods to evaluate local averages on this manifold. On the other hand we are studying many possible convolutions on the sphere to determine which one presents our needed properties. This project started only few months ago, but we are starting to obtain the first few promising results.