

## Spectral techniques for some time inhomogeneous and second-order Markov chains.

### Abstract

The talk consists of two parts. In the first part, starting from a given Markov kernel on a finite set  $V$  and a bijection  $g$  of  $V$ , we construct and study a time inhomogeneous Markov chain that exhibits wave-like behavior, i.e. whose kernel at time  $n$  is obtained from  $K$  by transport of  $g^{n-1}$ . We show that this construction leads to interesting examples and obtain quantitative results for some of these examples. This part is joint work with Laurent Saloff-Coste. In the second part, we consider second-order Markov chains that are trajectorially reversible, which is a generalization of the notion of reversibility for usual Markov chains. We study spectral properties of second order Markov chains which have a tendency to not return to their previous state. We confirm that resorting to second order chains can be an option to improve the speed of convergence to equilibrium. This part is joint work with Persi Diaconis and Laurent Miclo.