HOLONOMY INVERSE PROBLEMS

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Venue: Zoom: 618-038-6257 Passcode : SCMS

Abstract: A choice of a connection (on a vector bundle) enables one to parallely transport vectors along curves. Holonomy inverse problem poses the following question: can one uniquely determine a connection (up to natural equivalence) from parallel transport (holonomy) along a suitably chosen set of geodesic curves? On closed (compact and boundaryless) Riemannian manifolds, under a dynamical hypothesis ensuring that the geodesic flow is chaotic, I will demonstrate in many situations that only traces of holonomy along closed geodesics suffice to determine the connection. Moreover, I will show it is possible to complement the uniqueness result with a suitable stability estimate of Hölder type, i.e. that the traces of holonomy determine stably the connection. By recent embedding results, this has consequences for the analogous problem on manifolds with boundary. The proofs are based on a combination of microlocal analysis, analysis of resonances, and hyperbolic dynamics. This is joint work with Thibault Lefeuvre.