Abstract:
Fractal uncertainty principle states that no function can be localized to a fractal set simultaneously in position and in frequency. The strongest version so far has been obtained in one dimension by Bourgain and the speaker with recent higher dimensional advances by Han and Schlag.

I will present two applications of the fractal uncertainty principle. The first one (joint with Jin and Nonnenmacher) is a frequency-independent lower bound on mass of eigenfunctions on compact negatively curved surfaces, which in particular implies control for the Schrödinger equation by any nonempty open set. The second application (joint with Zahl) is an essential spectral gap for convex co-compact hyperbolic surfaces, which implies exponential energy decay of high frequency waves.