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Frequently hypercyclic operators on Banach spaces

(joint work with Frédéric Bayart).

If T is a bounded opeartor on a separable Banach space X, T is said to be *frequently hypercyclic* if there exists a vector $x \in X$ such that for every non empty open subset U of X, the set of integers n such that $T^n x$ belongs to U has positive lower density. We investigated this notion in a previous work, where we proved in particular that if X is a Hilbert space and T has "sufficiently many" eigenvectors associated to unimodular eigenvalues, then T is frequently hypercyclic. Here we study possible extensions of this result to general Banach spaces. It turns out that under some aditionnal asumptions either on the geometry of the space or on the regularity of the unimodular eigenvector fields, the same result holds true. For instance: if X has type 2 and T has a perfectly spanning set of eigenvectors associated to unimodular eigenvalues, then T admits a non degeneate gaussian measure m with respect to which it defines an ergodic measure-preserving transformation of $(X, \mathcal{B}, m)$, and T is frequently hypercyclic. If X is a general Banach space and the unimodular eigenvector fields of T can be chosen to be Lipschitz, then this is also true.