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On the rigidity of u-Gibbs measures for partially hyperbolic diffeomorphisms in dimension three.

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We consider diffeomorphisms of three manifolds having a non-trivial Df-invariant splitting $E^s \oplus E^c \oplus E^u$. In this setting, u-Gibbs measures are invariant measures with smooth conditionals along unstable manifolds. The set of all u-Gibbs measures plays a prominent role in the ergodic theory of these systems, for it contains the sets of all physical measures and SRB measures. When the center exponent is non positive, the measure is automatically SRB and even physical if the exponent is negative. Thus, a natural question is: given an ergodic u-Gibbs measure with positive exponent along the center, can we deduce that the measure is SRB, that is, that it has smooth conditionals along center-unstable manifolds? When the answer is yes, one also obtains that the measure is a physical measure. This question can be seen as a measure rigidity question since one desires to get some additional invariance along center manifolds. In this talk I intend to survey some developments on this question, and pose some problems.

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