MINIMAL ENTROPY OF 3-MANIFOLDS

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We present the solution of the minimal entropy problem for non-geometric, closed, orientable 3-manifolds (that is, those manifolds which do not admit a complete metric locally isometric to one of the eight 3-dimensional model geometries). Together with the results of Besson-Courtois-Gallot for locally symmetric spaces and the work of Soma, Gromov et.al. on the simplicial volume of 3-manifolds and its relation with entropy, this gives a complete picture of the minimal entropy problem for all closed, orientable 3-manifolds. Our work strongly builds on Souto's PhD work (unpublished), filling some gaps in the proof and completing the picture in the case of non-prime manifolds. In detail, we show that the minimal entropy is additive with respect to the prime decomposition and that for an irreducible manifold X it coincides with the sum of the volume entropies $\text{Ent}(X_k, hyp)^3 \text{Vol}(X_k, hyp)$ of all the JSJ components X_k of hyperbolic type, each endowed with its complete, hyperbolic metric of finite volume. For the lower bound of $\text{MinEnt}(X)$, we adapt Besson-Courtois-Gallot's barycenter method following Souto's ideas; then, we show how this lower bound is realized by producing a sequence of Riemannian metrics g_k on X whose volume-entropies tend to $\sum_k \text{Ent}(X_k, hyp)^3 \text{Vol}(X_k, hyp)$.

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