

**Bavard, C.**

**Courbure presque négative en dimension 3. (Almost negative curvature in dimension 3).**  
(French) [Zbl 0642.53047](#)  
*Compos. Math.* 63, 223-236 (1987).

The following striking theorem is proved: Any closed orientable 3- manifold,  $M$ , admits a riemannian metric with  $\text{curve}(M) \leq 1$ ,  $\text{diam}(M) \leq \epsilon$ , and  $\text{Vol } M \leq \epsilon$ , for any  $\epsilon > 0$ . The first construction of this kind was given by Gromov in the case  $M = S^3$  [cf. *P. Buser* and *D. Gromoll*, Gromov's examples of almost negatively curved metrics on  $S^3$  (to appear)]. In these examples the lower bound for the curvature goes to  $-\infty$ . This is indeed necessary as was shown recently by Fukaya and Yamaguchi.

Reviewer: [K.Grove](#)

**MSC:**

[53C20](#) Global Riemannian geometry, including pinching

Cited in **1** Review  
Cited in **2** Documents

**Keywords:**

diameter; volume; almost negatively curved metrics; curvature

**Full Text:** [Numdam](#) [EuDML](#)

**References:**

- [1] C. Bavard : thèse de 3ème cycle . Orsay (1984).
- [2] A. Besse : Manifolds all of whose geodesics are closed . Springer (1978). · [Zbl 0387.53010](#)
- [3] P. Buser et D. Gromoll : Gromov's examples of almost negatively curved metrics on  $S^3$ , notes .
- [4] G. Darboux : Leçons sur la Théorie générale des Surfaces , Vol. 3, Chelsea (réédition) (1972).
- [5] H.B. Lawson : Foliations . *Bull. A.M.S.* 80 (1974) 369-418. · [Zbl 0293.57014](#) · [doi:10.1090/S0002-9904-1974-13432-4](#)
- [6] B O'Neill : The fundamental equations of a submersion . *Michigan Math. J.* 13 (1966) 459-469. · [Zbl 0145.18602](#) · [doi:10.1307/mmj/1028999604](#)
- [7] D. Rolfsen : Knots and links . Publish or Perish (1976). · [Zbl 0339.55004](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.