

STANFORD PROBABILITY SEMINAR

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Tuesday, 12 April 2005

4:15pm (Refreshments at 4pm in the 1st Floor Lounge)

Sequoia Hall, Room 200

Shannon's problem on the monotonicity of entropy

Abstract. The entropy of a random variable with density f is defined as the integral of $-f \log f$. In the 1940s Shannon proved that if X_1 and X_2 are i.i.d., then the entropy of $(X_1 + X_2)/\sqrt{2}$ is at least the entropy of X_1 . The problem whether, for i.i.d. random variables X_i , the entropy of $(X_1 + \dots + X_n)/\sqrt{n}$ is an increasing sequence remained open. In this talk we will show that, indeed, entropy increases along central limit averages. The proof is based on a new variational formula which is motivated by (a proof of) the Brunn-Minkowski inequality.

Based on joint works with S. Artstein, K. Ball and F. Barthe.