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V6T1Z2, Canada. *Buffon's needle estimates and vanishing sums of roots of unity.*

Buffon's needle problem concerns estimates on the average (with respect to angle) length of 1-dimensional projections of finite iterations of planar Cantor sets. The purpose of the talk will be to present the recent results of Bond, Volberg, and the author. We will emphasize the number-theoretic aspects of the problem, including a surprising connection to the classic results of Redei, de Bruijn, Schoenberg, Mann, and others on the classification of vanishing sums of roots of unity. (Received September 04, 2012)