

1019-11-9

Roger C Baker* (baker@math.byu.edu), Department of Mathematics, Brigham Young University, Provo, UT 84602. *Sums of two relatively prime cubes*. Preliminary report.

A number of authors have worked on the question of the error term in the summatory function of $r(n)$, where $r(n)$ denotes the number of representations of n as the sum of two relatively prime cubes. In recent years the improvements given have been conditional on the Riemann Hypothesis, and the same applies to the result described in the present talk. We give a substantial improvement of the most recent result of this kind, due to W. Zhai. The main innovations in the proof are seven new estimates for 'bilinear' exponential sums in which the coefficients may be unknowns, depending on the type of sum under consideration, and the exponentiated function is partly or wholly monomial. One of these estimates is an important result of Robert and Sargos (to appear, *Crelle*) and the others were developed by the speaker in a recently submitted paper. There are quite diverse applications of this type of exponential sum, dating back to a well known work of Piatetski-Shapiro, over the last half century or so. I will give a brief overview of estimates of this kind. (Received May 02, 2006)