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*On a Conjecture of Bateman about  $r_5(n)$*

Let  $r_5(n)$  be the number of ways of writing  $n$  as a sum of five integer squares. In his study of this function, Bateman was led to formulate a conjecture regarding the sum

$$\sum_{|j| \leq \sqrt{n}} \sigma(n - j^2)$$

where  $\sigma(n)$  is the sum of positive divisors of  $n$ . We give a proof of Bateman's conjecture in the case  $n$  is square-free and congruent to 1 (mod 4). This is joint work with Prof. Ram Murty (Queen's University).