Slim exceptional sets for stout representation problems

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Abstract. One may loosely refer to a representation problem as being stout when there potentially exists a set of integers possessing unexpectedly many representations in some prescribed form. Available methods for estimating the size of such sets have hitherto revolved around the application of Bessel's inequality, in one incarnation or another. By using "slim" technology recently developed for the estimation of exceptional sets in Waring's problem, we now establish non-trivial estimates for these stout problems that go beyond those accessible to the classical methods. There are consequences for correlated mean values of exponential sums, the density of rational solutions of systems of diagonal equations, and Waring's problem. Some of the work described is joint with Joerg Bruedern.