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*A slice or two of a diagonal cubic: arithmetic stratification via the circle method*

Some 25 years ago, Vaughan and the speaker obtained asymptotic upper and lower bounds for the number of non-trivial integral points on the Segre cubic

$$x_1^3 + \dots + x_6^3 = x_1 + \dots + x_6 = 0$$

with naive height bounded by a large parameter  $B$ . Seeking an explanation for the “unexpected” growth rate  $B^2(\log B)^5$ , we offered a heuristic explanation for the role of the major and minor arc contributions in the application of the circle method to this problem, and connected these terms with Manin’s ideas on arithmetic stratification. We now consider diagonal cubics in more variables with one or two linear slices in the light of recent progress on Vinogradov’s mean value theorem. In particular, in work joint with Joerg Bruedern, we are able to prove an asymptotic formula in which Manin’s arithmetic stratification identifies naturally and provably in terms of major and minor arc contributions from the circle method.