ON TRANSLATION INVARIANT QUADRATIC FORMS

The detection of k-term progressions (or more general: solutions to translation invariant linear forms) in dense sets is one of the main problems studied in 'Additive Ramsey Theory'. In my talk I will explain the difficulties that arise when we try to extend the results to equations of higher degree and especially how the circle method approach is used to tackle the first non-trivial problem of a diagonal quadratic system:

$$d_1 x_1^2 + \ldots + d_s x_s^2 = 0,$$
$$d_1 x_1 + \ldots + d_s x_s = 0,$$

with $d_1 + \ldots + d_s = 0$ and $s > 6$.