

**ON PRIME SOLUTIONS TO LINEAR AND QUADRATIC
EQUATIONS.**

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ABSTRACT. The classical results of Vinogradov and Hua establishes prime solutions of linear and diagonal quadratic equations in sufficiently many variables. In the linear case there has been a remarkable progress over the past few years by introducing ideas from additive combinatorics. We will discuss some of the key ideas, as well as their use to obtain multidimensional extensions of the theorem of Green and Tao on arithmetic progressions in the primes. We will also discuss some new results on prime solutions to non-diagonal quadratic equations of sufficiently large rank. Most of this is joint work with B. Cook.