1116-11-872 **Kevin Henriot*** (khenriot@math.ubc.ca), Deparment of Mathematics, The University of British Columbia, Room 121, 1984 Mathematics Road, Vancouver, BC V6T 1Z2, Canada. *Additive Diophantine equations in dense variables.*

Consider coefficients $\lambda_1, \dots, \lambda_s \in \mathbb{Z} \setminus \{0\}$ such that $\lambda_1 + \cdots + \lambda_s = 0$, and a system of integer homogeneous polynomials $\mathbf{P} = (P_1, \dots, P_r)$ in d variables. We study translation-invariant systems of equations of the form

$$\lambda_1 P_j(\mathbf{n}_1) + \cdots + \lambda_s P_j(\mathbf{n}_s) = 0 \qquad (1 \le j \le r)$$

in variables $\mathbf{n}_1, \dots, \mathbf{n}_d \in [N]^d$. We show that, for essentially the same number of variables currently needed to count the number of solutions in $[N]^d$ via the circle method, there exist nontrivial solutions to the system of equations in any subset of $[N]^d$ of density at least $(\log N)^{-c(\mathbf{P},\boldsymbol{\lambda})}$. We employ the energy increment method in additive combinatorics together with a weak form of discrete restriction estimates. (Received September 14, 2015)