Cost of Brown's PGCD in $\mathbb{Z}_p[x_1, \ldots, x_n]$

Suppose $g = x_1^d + 2x_2^d + \cdots + nx_n^d$.

Need $\geq (d+1)^{n-1}$ univariate images of g in $\mathbb{Z}_p[x_1]$

$\geq O(d^2)(d+1)^{n-1} = O(d^{n+1})$ arith. ops in $\mathbb{Z}_p$

↑ Euc. Alg. ↑ exponential in n

Zippels sparse GCD algorithm 1979.

Suppose $g = c_0 x_1^d + \sum_{i=0}^{d-1} c_i(x_2, \ldots, x_n) x_1^i$

Let $t = \max_{i=0}^{d-1} \# c_i$ and $d_i = \deg_{x_i}(g)$.

Needs $\leq \left(\sum_{i=2}^{n} d_i\right) \cdot t$ univariate images.

Hu and Monagan's sparse GCD 2016

Needs $2t+2$ univariate images.