

Other Cranks

Let  $t \geq 2$ .

Defn Given the Ferrers diagram of a partition we label a node in the  $i$ th row &  $j$ th col. by least nonneg residue of  $j - i \pmod{t}$ .

The resulting diagram is called a  $t$ -residue diagram.

Ex  $\pi = (11, 7, 3, 3)$ ,  $t = 5$ .

0	1	2	3	4	0	1	2	3	4	0
4	0	1	2	3	4	0				
3	4	0								
2	3	4								

For each  $0 \leq i \leq t-1$  let

$$r_i = r_i(\pi) = \# \text{ of nodes labelled } i \pmod{t} \text{ in the } t\text{-residue diagram of } \pi.$$

For example, for  $\pi$  above

$$(r_0, r_1, r_2, r_3, r_4) = (6, 3, 4, 5, 6).$$

Define

$$t\text{-core-crank}(\pi) := \sum_{j=0}^{t-1} \left( j - \left( \frac{t-1}{2} \right) \right)^{t-3} (r_j - r_{j+1}),$$

where  $r_t := r_0$ .

Theorem: (G., Stanton & Kim, 1990)

Let  $(t, \delta) = (5, 4)$ ,  $(7, 5)$  or  $(11, 6)$ .

Then the  $t$ -core-crank  $\pmod{t}$  divides the partitions of  $tn + \delta$  into  $t$  equal classes.