Let $\Gamma^*(k)$ be the smallest integer $s$ such that the equation

$$a_1x_1^k + \cdots + a_sx_s^k = 0$$

has a nontrivial solution in every $p$-adic field $\mathbb{Q}_p$, regardless of the values of the (rational integer) coefficients. An old conjecture of Norton was that we should have $\Gamma^*(k) \equiv 1 \pmod{k}$ for all degrees $k$. This was disproved in 1974 by Bovey, who showed that $\Gamma^*(8) = 39$, but until a few years ago this was the only known counterexample. In this talk, we show that there are infinitely many counterexamples to Norton’s conjecture. (Received September 06, 2020)