The first order theory of a henselian valued field of residue characteristic zero is well-understood through the celebrated Ax-Kochen-Ershov principle, which states that it is completely determined by the theory of the residue field and the theory of the value group. For henselian valued fields of positive residue characteristic, no such general principle is known. I will report on joint work with Sylvy Anscombe in which we study (parts of) the theory of equicharacteristic henselian valued fields and prove an Ax-Kochen-Ershov principle for existential (and slightly more general) sentences. I will also discuss applications to the existential decidability (Hilbert’s tenth problem) of the local field $\mathbb{F}_q((t))$, which was proven by Denef and Schoutens assuming resolution of singularities. Further applications, on definability of henselian valuation rings, are reported on in a separate talk by Sylvy Anscombe. (Received September 15, 2015)