Simple Skew Braces (Nigel Byott, University of Exeter)

The Yang-Baxter Equation plays an important role in many areas of mathematics, including knot theory and quantum groups. In 1990, Drinfeld suggested looking for set-theoretic solutions. Various algebraic structures have been introduced in order to construct such solutions. Among these are braces, first defined by Rump in 2007, and more generally, skew braces defined by Guarnieri and Vendramin in 2017. A skew brace $(B, +, \circ)$ consists of a set B with two operations, each making B into a group, and satisfying a certain compatibility condition. It is a brace if the group $(B, +)$ is abelian. As with finite groups, one would like to understand all simple finite skew braces. Constructions have been given for large families of simple braces, but little is known about simple skew braces. Recently Vendramin showed by a computer search that the smallest simple skew brace which is not a brace has order 12. I will explain a fairly explicit construction for an infinite family of simple skew braces (which are not braces), with Vendramin's example as the smallest member of this family.