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*Perfect Cuboids and the Box Variety*

A perfect cuboid is a rectangular box (cuboid) whose edges, face diagonals and body diagonal all have integer length. It is an old open problem (perhaps dating back to Euler or before) whether there are any perfect cuboids. It is also unknown whether there can be at most finitely many perfect cuboids.

The box variety is an explicit algebraic surface in 6-dimensional projective space whose points with positive integer coordinates correspond precisely to the perfect cuboids. In the last few years several people (Beauville, Freitag, Salvati Manni, Stoll, Testa and others) have studied the geometric structure of the box variety, and this sheds new insight into the above open problems.

In my talk I will first discuss some early history of perfect cuboids. Then I will explain what is known about the box variety, and how this relates to the open problems.