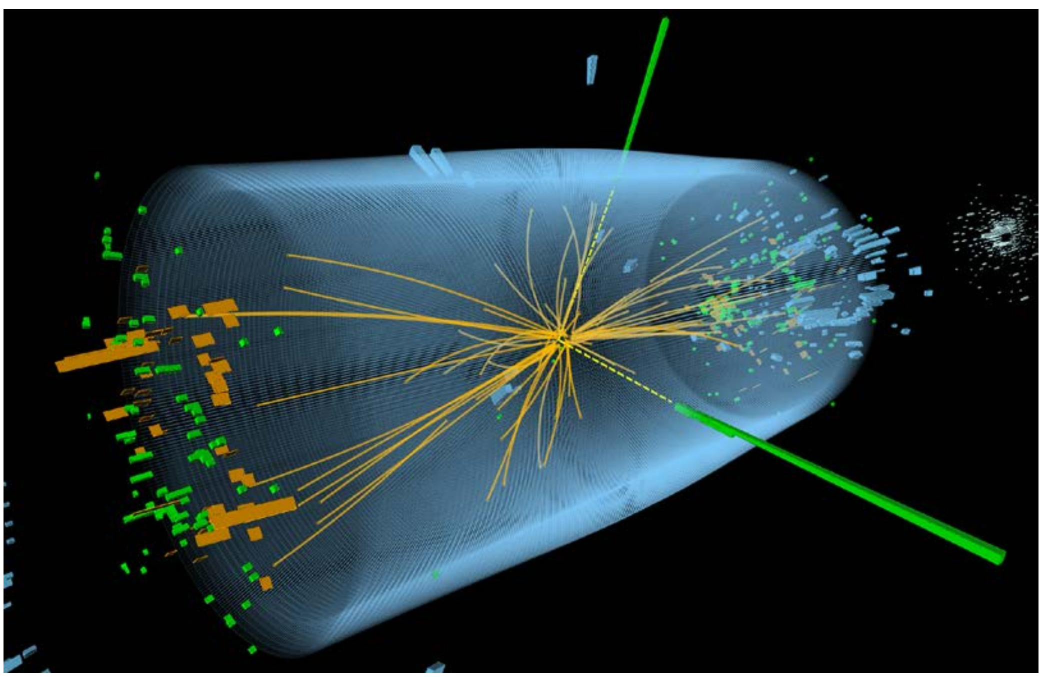

# Exposing a Particle of Truth

The massive experiments that led to the discovery of a Higgs boson (a subatomic particle) are a triumph for both particle physics and mathematics. The particle's existence was predicted using—among other branches of mathematics—multivariable calculus, vector analysis, and linear algebra. Furthermore, the four dimensions of an algebraic structure known as a *group* correspond to four fundamental carriers of force, three of which carry nuclear forces and interact with the Higgs field to give particles mass. And since a Higgs boson is not the kind of thing you can point to or see, probability and statistics provided both the means to select the most relevant data from independent experiments and the verification that those experiments did indeed indicate the presence of the long sought-after particle.

The discovery answered some questions, but not all. Researchers must now determine how many types of Higgs bosons there are, how they interact with other particles, and the implications for other theories, such as supersymmetry. This will require more grand experiments and even larger super colliders. Yet even though the super colliders are vast and generate tremendous energies, their power must still yield to that of the insight gained from certain fundamental equations and their logical implications.

**For More Information**: *What's Happening in the Mathematical Sciences*, Vol. 9, Dana Mackenzie, 2013.



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