"And we should be able to find, by clever maths or something, the following:"

— Imre Leader

The Trivial Notions Seminar
Proudly Announces

The Infinitesimal Site and de Rham Cohomology

A talk by
Tom Lovering

Abstract

Ever since topologists defined the cohomology groups $H^i(X(\mathbb{C}), \mathbb{Z})$ of a complex manifold, they have been indispensible tools in algebraic geometry. A central guiding question is to give, for X an algebraic variety, purely algebraic constructions of these invariants. At least in characteristic zero, a very successful such construction is de Rham cohomology, which is given by the hypercohomology of the complex of differential forms. This also has the advantage of being very explicit. However, it does not come with a direct interpretation as some kind of sheaf cohomology, making it difficult to conceptualise.

In this talk, we will discuss Grothendieck's remedy to this deficiency. We will define a site (his generalisation of a topological space) called the infinitesimal site. We will also give a class of sheaves on this site that correspond to vector bundles with flat connection, and sketch the argument proving that the cohomology of such sheaves computes algebraic de Rham cohomology.

We will also say a word or two about how this conceptual framework gives rise to crystalline cohomology, an important solution to the problem of constructing cohomology groups in characteristic p.

Thursday, October 22$^{\text{nd}}$, at 12:45 pm
Science Center 232