周杨

April 20, 2013, Saturday, 13:30-16:30
紫金港 东 6-416

Title   Cohomology of Sheaves

Abstract   The concept of sheaves was introduced into algebraic topology by J. Leary in 1946. It has become a basic tool in modern mathematics, especially in algebraic geometry and algebraic topology. It provides a common formalization and generalization of many ideas in geometry. A sheaf on a topological space is an assignment to each open subset some data in such a way that globally assigned data is completely determined by its local behavior. This will be made precise at the beginning of the talk.

The full power of sheaves lies in the fact that sheaves of abelian groups on a fixed space forms an abelian category with enough injective objects. Hence the machinery of homological algebra applies. I will define sheaf cohomology in two ways: Cech cohomology and right derived functors of the global section functor. After that, I will show that sheaf cohomology functors should be regarded as universal cohomological \delta-functors. Using this, I will be able to show that various approaches to sheaf cohomology coincide in reasonable circumstances.

References
[1] S. Mac Lane, *Categories for the Working Mathematician*. (Adjoints, limits, abelian category)
[2] C. Weibel, *An Introduction to Homological Algebra*. (Chapter 2, Derived functor)
[3] A. Grothendieck, *Sur quelques points d'algèbre homologique.*
[4] F. Warner, *Foundations of Differentiable Manifolds and Lie Groups.* (Chapter 5, Sheaves, cohomolgy, and the de Rham theorem)
[5] R. Vakil, *Foundations of Algebraic Geometry*. (Chapter 18, Cech cohomology of quasicoherent sheaves, Chapter 23, Derived functors)

Other sources:
[6] R. Wells, *Differential Analysis on Complex Manifolds*. (Chapter 2, Sheaf theory)
[7] Gunning and Rossi, *Analytic Functions of Several Complex Variables*. (Chapter 6, Cohomology theory)
[8] O. Forster, *Lectures on Riemann Surfaces*. (Section 6, Sheavse, Section 15 The exact cohomology sequence)
[9] R. Hartshorne, *Algebraic Geometry*. (Chapter 3, Cohomology)
[10] Griffith and Harris, *Principles of Algebraic Geometry*. (Chapter 1, Section 3, Sheaves and cohomology)
[11] B. Iversen, *Cohomolgy of Sheaves*