Equivariant cohomology theories and their multiplication

Cohomology theories are of great importance for studying topological spaces. They take as input topological spaces and as output give a collection of abelian groups. They satisfy a useful collection of axioms which (in theory) make these groups computable.

If X is a space with an action of a compact Lie group G and E is a cohomology theory, then $E^*(X)$ also has a G-action. But this action often fails to give us more information. For example if G is the circle group, then the action on cohomology is always trivial. So there is a need for cohomology theories that use the G-action in a more fundamental way.

Working from a fairly basic level, we will introduce the notion of equivariant cohomology theories and give an idea of how they can detect more data than non-equivariant cohomology theories. We will end with a brief description of recent work understanding the multiplicative properties of rational equivariant cohomology theories.