

MATH COLLOQUIUM

A short introduction to Lefschetz theory on the topology of algebraic varieties

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Time: 14:00

Place: TB 250, Boğaziçi Üniversitesi

Abstract: In his book ‘L’analysis situs et la géométrie algébrique’, S. Lefschetz proved two essential results on the topology of algebraic varieties: the Hyperplane Section Theorem and so-called Second Lefschetz Theorem. These results give a comparison between the homology groups of a non-singular irreducible projective variety X in $\mathbb{C}P^n$ and the homology groups of a generic hyperplane section of X . Precisely, the Hyperplane Section Theorem says that, for a generic hyperplane L , the natural map

$$H_q(L \cap X) \rightarrow H_q(X)$$

is an isomorphism for $q \leq \dim X - 2$ and an epimorphism for $q = \dim X - 1$. The Second Lefschetz Theorem describes the kernel of the map

$$H_{\dim X - 1}(L \cap X) \rightarrow H_{\dim X - 1}(X)$$

in terms of vanishing cycles that appear in a generic pencil of hyperplanes. In this talk, I will discuss generalization of these theorems to quasi-projective varieties and homotopy groups.

Tea and coffee will be served at 15:00