

**Speaker:** **Antonio Lerario**  
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Thursday, April 11, 2013  
2:00 pm  
Room: 258 Hurley Hall

**Title:** Statistics on Hilbert's sixteenth problem

**Abstract:**

The topology of a generic real hypersurface of degree  $d$  in  $\mathbb{C}\mathbb{P}^n$  is completely determined by  $d$ , but the only information we have about its real part is Milnor's bound, which implies that it has at most  $O(d^n)$  connected components. Hilbert's Sixteenth problem asks to study the possible numbers of connected components, between zero and  $O(d^n)$ .

We show that a random real algebraic hypersurface of degree  $d$  in  $\mathbb{R}\mathbb{P}^n$  has on average  $O(d^n)$  components, the asymptotic being in  $d$  for  $n$  fixed. Thus, random hypersurfaces exhibit maximal behavior in light of Milnor's bound. Similar questions can be formulated in the framework of Riemannian manifolds (polynomials of degree  $d$  should be replaced by sums of eigenfunctions of the Laplacian up to a specified eigenvalue). This is a joint work with E. Lundberg.