

# Mini-workshop on Geometric Analysis (I)

*harmonic maps and harmonic functions*

*Xiamen University*

*Oct. 27, 2018*

(厦门大学海韵园实验楼 105 报告厅)

Time	Speaker	Title
9:00 – 10:30	<b>Xiantao Huang</b> Sun Yat-sen University	The asymptotic behavior of the dimension of spaces of harmonic functions with polynomial growth
10:30 – 11:00	break	
11:00 – 12:00	<b>Miaomiao Zhu</b> Shanghai Jiao Tong University	Regularity for critical elliptic systems and applications to harmonic map type problems
12:00 – 14:30	break	
14:30 – 15:30	<b>Hao Yin</b> University of Science and Technology of China	higher order neck analysis of harmonic maps
15:30 – 16:00	break	
16:00 – 17:00	<b>Bo Chen</b> Chinese Academy of Science	Singularity of Yang-Mills-Higgs fields on surfaces

## Abstracts

**Bo Chen** (Chinese Academy of Science)

*Singularity of Yang-Mills-Higgs fields on surfaces*

Abstract: The Yang-Mills-Higgs fields are critical points of the famous

Yang-Mills-Higgs functional. In this talk, I will present a sharp estimate near isolated singular points of the Yang-Mills-Higgs fields on surfaces. It is well-known that the singularity is removable if the limiting holonomy at the singular point vanishes. We will generalize this result and establish a precise relation between the order of singularity and limiting holonomy. This is a recent joint work with Chong Song.

**Xiantao Huang** (Sun Yat-sen University)

*The asymptotic behavior of the dimension of spaces of harmonic functions with polynomial growth*

Abstract: Suppose  $(M, g)$  is a noncompact Riemannian manifold with nonnegative Ricci curvature, and let  $h_d(M)$  be the dimension of the space of harmonic functions with polynomial growth of growth order at most  $d$ . Colding and Minicozzi proved that  $h_d(M)$  is finite. Later on, there are many researches which give better estimates of  $h_d(M)$ . In this talk, we will present the work on asymptotic behavior of  $h_d(M)$  when  $d$  is large. More precisely, suppose that  $(M, g)$  has maximal volume growth and its tangent cone at infinity is unique, then when  $d$  is sufficiently large, we obtain some estimates of  $h_d(M)$  in terms of the growth order  $d$ , the dimension  $n$  and the asymptotic volume ratio of  $(M, g)$ .

**Hao Yin** (University of Science and Technology of China)

*higher order neck analysis of harmonic maps*

Abstract: It is well known that when we study a sequence of harmonic maps from surfaces with bounded Dirichlet energy, bubbles may appear and there is a neck region in which the behavior of the maps are subtle. We explain that in some sense the classical results of energy identity and no neck theorem are Holder uniform estimates on the neck. Then, we show more uniform estimates that are higher order generalizations of them.

**Miaomiao Zhu** (Shanghai Jiao Tong University)

*Regularity for critical elliptic systems and applications to harmonic map type problems*

Abstract: In this talk, we shall talk about the regularity theory for certain critical elliptic systems and discuss applications to some PDEs from geometry and physics, for instance, harmonic maps into certain pseudo-Riemannian manifolds and critical points of some action functional motivated from quantum field theory.