



首都师范大学数学科学学院

School of Mathematical Sciences Capital Normal University

# Geometry Seminar

2021年12月4日

首都师范大学

## 一、会议信息

首都师范大学数学科学学院拟于 2021 年 12 月 4 日以线上线下相结合的方式举办学术会议“2021 年Geometry Seminar”。本次会议将邀请微分几何领域的优秀青年学者报告相关领域的最新研究成果及发展动态，进一步加强微分几何领域青年研究人员的学术合作与交流，促进国内微分几何领域的发展。

### 会议组织者：

张振雷，沈伟明，王越

### 线上腾讯会议：

会议 ID: 941-276-563

会议链接: <https://meeting.tencent.com/dm/mK5hnAbZTuai>

### 线下会议地址：

首都师范大学校本部教二楼713教室

## 二、日程表

日期	时间	报告人	事项	主持人	
12月 4日	8:50-9:00	开幕式			
	9:00-10:00	陈学长 (南京大学)	Improved Sobolev trace inequalities in the unit ball under constraints	张振雷	
	10:05-11:05	熊金钢 (北京师范大学)	Non-smoothness of solutions to the $\sigma_k$ -Loewner-Nirenberg problem in domains with nontrivial topology		
	11:05-14:00	午餐			
	14:00-15:00	王芳 (上海交通大学)	The relative volume of Poincare-Einstein manifolds	张振雷	
	15:05-16:05	夏超 (厦门大学)	Rigidity of stable capillary hypersurfaces supported on a horosphere		
	16:05-17:00	分组讨论			

### 三、报告题目与摘要

#### Improved Sobolev trace inequalities in the unit ball under constraints

陈学长（南京大学）

We establish sequences of Sobolev trace inequalities of orders two and four on the unit ball with constraint of higher order moments of the boundary volume element. Moreover, in most cases we succeed in constructing precise test functions and then show that such inequalities are almost optimal. Our Sobolev trace inequalities can be regarded as extensions of the Aubin's improved Sobolev trace inequality on the unit ball and generalized Lebedev-Milin inequality. This is also closely related to recent work of A. Chang-F. Hang and F. Hang-X. Wang.

Finally, we will mention some open problems in this direction. This is based on two preprints: One is joint with Nan Wu and the other is joint with Wei Wei still in progress.

#### Non-smoothness of solutions to the $\sigma_k$ -Loewner– Nirenberg problem in domains with nontrivial topology

熊金钢（北京师范大学）

I will talk about a joint work with Yanyan Li and Luc Nguyen about the regularity of viscosity solutions to the  $\sigma_k$ -Loewner–Nirenberg problem in bounded domains,  $k \geq 2$ . When the domains' boundaries have more than one connected components, we show that viscosity solutions are not  $C^1$ . However, the Lipschitz regularity was known. On the other hand, we establish smoothness of the viscosity solutions near the boundaries.

#### The relative volume of Poincare-Einstein manifolds

王芳（上海交通大学）

For a Poincare-Einstein manifold, the Bishop-Gromov comparison theorem tells us that the relative volume is a non-increasing function of the geodesic radius. In this talk, I will show that the fractional Yamabe constant at the conformal infinity provides a lower bound for this function. As an application, this implies a gap phenomena and the rigidity theorem.

# Rigidity of stable capillary hypersurfaces supported on a horosphere

夏超 (厦门大学)

In this talk, we introduce the stability problem for capillary hypersurfaces, especially free boundary CMC hypersurfaces. We prove that any stable capillary hypersurfaces supported on a horosphere is umbilical. This is a joint work with Jinyu Guo and Guofang Wang.

