中科院数学与系统科学研究院
数学研究所
学术报告

多复变与复几何研讨班

报告人：刘冰萧 **(科隆大学)**

题　目：**Introduction to random zeros of holomorphic sections: construction of random sections**

时　间：**2024.03.19（星期二）15:00-16:30**

地　点：腾讯会议：578-433-546

摘　要：**For a compact Kähler manifold, by considering the high tensor powers of a prequantum line bundle, Shiffman and Zelditch (1999, CMP) proved the equidistribution of the zeros of random holomorphic sections in the semiclassical limit. Then several generalizations and extensions of this result have been made in different geometric or probabilistic settings. Notably, the large deviation estimates and hole probabilities for the random zeros were also established on compact Hermitian manifolds. In this series of lectures, I will give an introduction to these results and their generalization to the case of noncompact Hermitian manifolds.**

Specially, as the first part of the lectures, I will discuss the constructions of the Gaussian random holomorphic sections of holomorphic line bundles and the methods to study their zeros. A particular case is that the space of square-integrable holomorphic sections is infinite-dimensional.

题　目：**Introduction to random zeros of holomorphic sections: Bergman kernel and equidistribution of random zeros**

时　间：2024.03.21（星期四）15:00-16:30

地　点：腾讯会议：596-283-580

摘　要：For a compact Kähler manifold, by considering the high tensor powers of a prequantum line bundle, Shiffman and Zelditch (1999, CMP) proved the equidistribution of the zeros of random holomorphic sections in the semiclassical limit. Then several generalizations and extensions of this result have been made in different geometric or probabilistic settings. Notably, the large deviation estimates and hole probabilities for the random zeros were also established on compact Hermitian manifolds. In this series of lectures, I will give an introduction to these results and their generalization to the case of noncompact Hermitian manifolds.

In this second part, I will start with an overview on the Bergman kernel expansions for complete Hermitian manifolds (following Ma-Marinescu), then explain how to apply them to obtain the equidistribution results for random zeros in the semiclassical limit.

题　目：Introduction to random zeros of holomorphic sections: large deviation and hole probability

时　间：2024.03.26（星期二）15:00-16:30

地　点：腾讯会议：116-754-858

摘　要：For a compact Kähler manifold, by considering the high tensor powers of a prequantum line bundle, Shiffman and Zelditch (1999, CMP) proved the equidistribution of the zeros of random holomorphic sections in the semiclassical limit. Then several generalizations and extensions of this result have been made in different geometric or probabilistic settings. Notably, the large deviation estimates and hole probabilities for the random zeros were also established on compact Hermitian manifolds. In this series of lectures, I will

give an introduction to these results and their generalization to the case of noncompact Hermitian manifolds.

In the third part, I will explain the large deviation estimates and hole probability of random zeros, specially, to prove these results, we need to introduce the normalized Bergman kernel as the correlation function of the random holomorphic section and prove a near-diagonal asymptotic formula for it.

题　目：**Introduction to random zeros of holomorphic sections: number variance and central limit theorem**

时　间：**2024.03.28（星期四）15:00-16:30**

地　点：**腾讯会议：870-915-067**

摘　要：　**For a compact Kähler manifold, by considering the high tensor powers of a prequantum line bundle, Shiffman and Zelditch (1999, CMP) proved the equidistribution of the zeros of random holomorphic sections in the semiclassical limit. Then several generalizations and extensions of this result have been made in different geometric or probabilistic settings. Notably, the large deviation estimates and hole probabilities for the random zeros were also established on compact Hermitian manifolds. In this series of lectures, I will give an introduction to these results and their generalization to the case of noncompact Hermitian manifolds.**

As the last part of the lectures, we will focus on the number variance and the asymptotic normality of random zeros. In particular, I will recall the results proved by Sodin-Tsirelson (2004, Israel J. Math.) for special models on complex plane and by Shiffman-Zelditch (2008, GAFA and 2010, Pure Appl. Math. Q.) for compact Kähler manifolds.