

# A U S H A N G

## FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

## D I S P U T A T I O N

**Donnerstag, 5. Dezember 2019, 16:00 Uhr**

**Ort: Seminarraum 119**

**(Fachbereich Mathematik und Informatik, Arnimallee 3, 14195 Berlin)**

**Disputation über die Doktorarbeit von**

**Herrn Jorge Alberto Olarte**

Thema der Dissertation:

**Polytopal subdivisions in Grassmannians, tropical geometry and algebraic curves**

Thema der Disputation:

**Plabic Graphs and the Positive Grassmannian**

Die Arbeit wurde unter der Betreuung von **Prof. Dr. C. Haase** durchgeführt.

Abstract:

The totally positive (and totally non negative)  $k, n$ -Grassmannian is the space of all  $k$  dimensional linear subspaces of the  $n$ -dimensional Euclidean space whose Plücker coordinates are all positive (non-negative respectively). It was studied by Postnikov, who gave a cell decomposition of the non negative Grassmannian whose cells are in bijection with a plethora of combinatorial objects, most notably positroids. The totally positive Grassmannian gained much attention after several connections to physics were established, including solutions to the KP equation for shallow water waves and scattering amplitudes in quantum field theory. In the latter, Feynman diagrams in the supersymmetric  $N=4$  Yang Mills theory are modeled by plabic graphs.

In this talk we will define plabic graphs and show how they can be used to study and answer several questions about the totally positive Grassmannian. Among such questions are: which sets of Plücker coordinates can vanish? How many Plücker coordinates have to be tested to decide total positivity? How to can we parametrize cells of the totally non-negative Grassmannian? What is its topology?

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

**Interessierte werden hiermit herzlich eingeladen**

Der Vorsitzende der Promotionskommission  
Prof. Dr. C. Haase