

# A U S H A N G

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## FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

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

**Donnerstag, 09. November 2023, 14:00 Uhr**

**Ort: Seminarraum  
(Zuse Institut Berlin, Takustr. 7, 14195 Berlin)**

**Disputation über die Doktorarbeit von**

**Johannes Zonker**

**Thema der Dissertation:**

**Coarse Graining of Agent-Based Models and Spatio-Temporal  
Modeling of Spreading Processes**

**Thema der Disputation:**

**Card Shuffling, Magic and True Randomness**

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

Abstract: Card tricks are an essential part of magic performances, and a classic variation is to find a card chosen by the audience in a seemingly random deck of cards. While many tricks are based on creating the illusion of interacting with the deck or skilled sleight of hand, some performers also use mathematical properties of card shuffling. Perfect shuffles can restore order to a chaotic arrangement, and residual structures after shuffling a previously ordered deck can be used to identify a selected card. This raises the question of whether human shuffling can properly randomize a deck of cards, and if so, how many shuffles are required?

In this talk, we will explore some famous results on the mathematics of card shuffling based on the analysis of the Gilbert-Shannon-Reeds (GSR) model for riffle shuffles. We will discuss the patterns that emerge from repeated riffle shuffles and the convergence to uniform random permutations. Finally, we will take a brief look at some numerical experiments based on Monte Carlo sampling to analyze a geometric model of (biased) riffle shuffles that may be closer to actual human card shuffling than the GSR model.

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. Schütte