

PhD Forum

Applied Probability

&

Mathematical Physics

Announcements

- New team member Numerical Analysis!



Roel Tielen



Marieke Kootte

- Next meeting: September 16
- Social activity during summer?

Schedule today

16:05 Introduction Applied Probability

Overview: Bart van Ginkel

*Projects: Simone Floreani
Jan-Tino Brethouwer*

16:25 Introduction Mathematical Physics

Overview: Amey Vasulkar

*Projects: Amey Vasulkar
Henk Jongbloed*

16:45 Discussion in break out rooms

***Save your questions and
pick an interesting room!***

17:00 Speed dating

Applied Probability

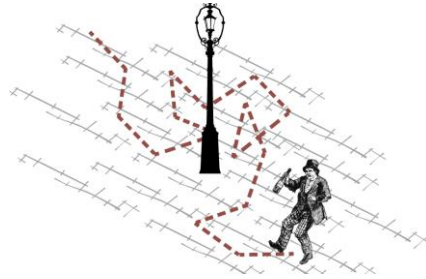
A brief overview

Applied Probability

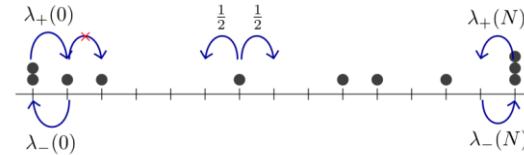
- Head of the group: Frank Redig
- Stats:
 - 12 professors
 - 4 teachers
 - 2 postdocs
 - 7 PhD candidates
- Main topics:
 - Statistical physics
 - Finance
 - Risk analysis
 - Ergodic theory and game theory

Statistical physics (1)

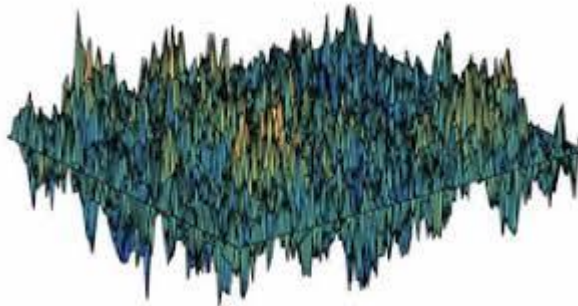
Random Walk



Interacting Particle Systems



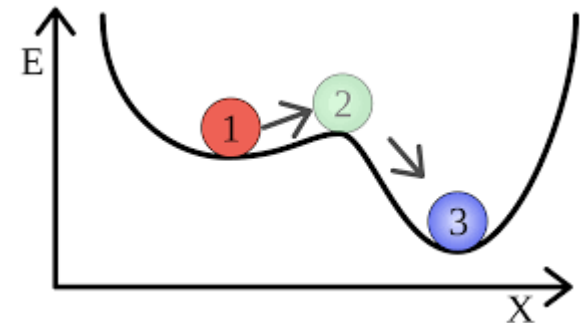
Random Fields



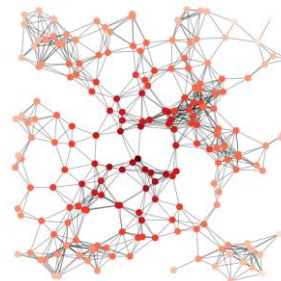
Large Deviations

$$\lim_{n \rightarrow \infty} \frac{1}{n} \log \mathbb{P}\left(\frac{1}{n} S_n \in A\right) = - \inf_{z \in A} I(z)$$

Metastability



Random Graphs



Statistical physics (2)



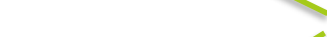
• Frank Redig

• Stefan Grosskinsky

• Alessandra Cipriani

• Richard Kraaij

• Elena Pulvirenti



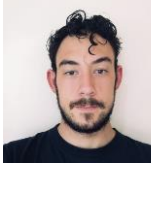
• Simone Floreani

• Bart van Ginkel

• Alan Rapoport

• Serena della Corte

• Vicente Lenz

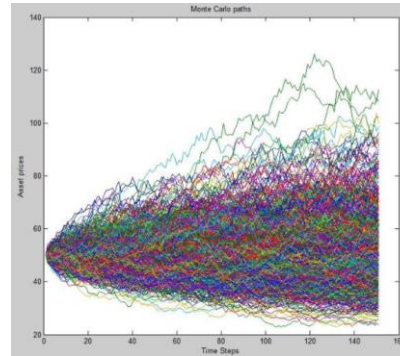


Financial mathematics

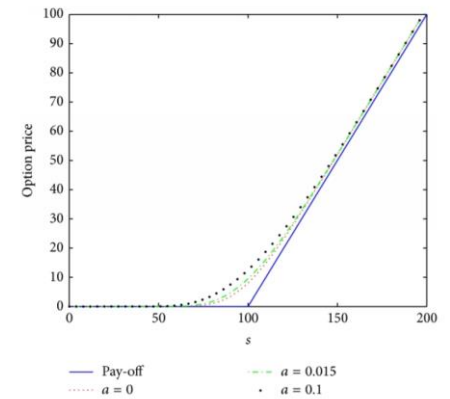
Share prices



Stochastic simulation



Option pricing



Stochastic calculus

$$x(t) = \int_0^t \sigma_1(s, t) dW_1(s) + \int_0^t \sigma_2(s, t) dW_2(s)$$

- Antonis Papapantoleon
- Jasper Anderluh
- Ludolf Meester



Risk analysis

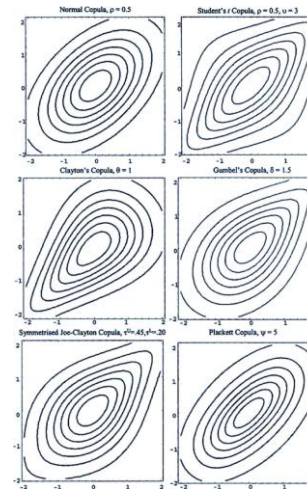
Expert judgment



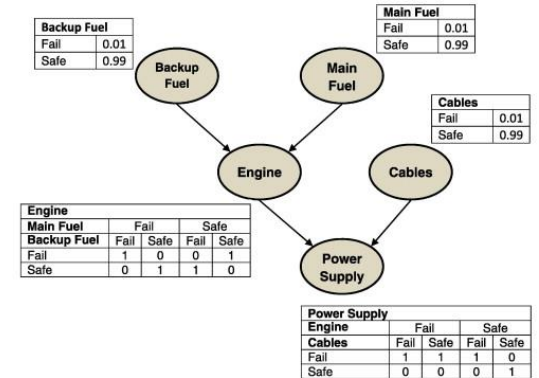
Risk analysis



Copulas



Bayesian Belief Network



• Dorota Kurowicka



• Tina Nane



• Kailun Zhu



Game theory

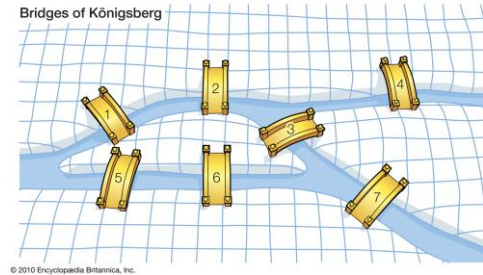
Analyse social media



Game theory

		Walter	
		confess	deny
Jessy	confess	Walter: 6 yrs Jessy: 6 yrs	Walter: 15 yrs Jessy: 2 yrs
	deny	Walter: 2 yrs Jessy: 15 yrs	Walter: 4 yrs Jessy: 4 yrs

Search games



- Robbert Fokkink

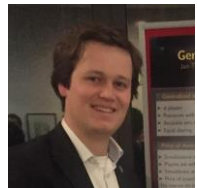
- Anne Buijsrogge



- Marijn ten Thij



- Jan-Tino Brethouwer

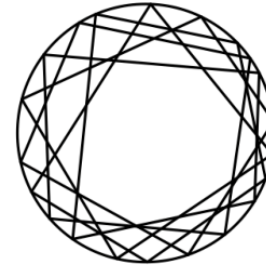


Ergodic theory

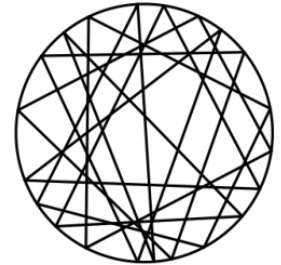
Continued fractions

$$\pi = 3 + \frac{1}{7 + \frac{1}{15 + \frac{1}{1 + \frac{1}{292 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2 + \frac{1}{1 + \frac{1}{3 + \frac{1}{1 + \dots}}}}}}}}}}}}}}}$$

Ergodic theory



A. Non-ergodic



B. Ergodic

Ergodic theorem

$$\frac{1}{n} \sum_{i=1}^{n-1} \varphi \circ f^i(x) \rightarrow \int_M \varphi(x)$$



- Cor Kraaikamp
- (also again Robbert Fokkink)

Teachers

- Andre Hensbergen
- Iris Smit
- Erdal Emsiz
- Marijn Jansen



Now presentations by:

- Simone Floreani
- Jan-Tino Brethouwer