



# Robert Fitzner

Mathematician with wide background and advanced programming experience

**Researcher:** 10 years high-level research in an international environment independent work on theoretical problems

Projects in interdisciplinary teams resulting in techniques applied in practice

Supervision of student internship at companies

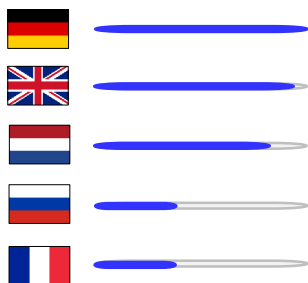
Keywords: stochastic modeling, random processes, risk modeling, large deviation, algorithms, criticality systems

**Developer:** 20 years of coding, JAVA within research JavaScript to create interactive animations.

study minor(Nebenstudium): software engineering & databases.

Student job as system administrator (maintain Unix/SunOS/Solaris systems)

Keywords: Java, JavaScript, Perl, C++, SQL, bash, HTML, CSS, GitHub, Mathematica



[www.fitzner.nl](http://www.fitzner.nl)

[robert@fitzner.nl](mailto:robert@fitzner.nl)

+31 6 1268 2355

**TU/e** Researcher, TU Eindhoven & ICMS since 2015



Researcher, Stockholm University 2013-2015

**TU/e** PhD Student, TU Eindhoven&EURANDOM 2008-2013  
Degree: PhD mathematical physics



System administrator (student job), 2005-2008  
Forschungsverbund Berlin



Student of mathematics, TU Berlin Degree: 2002-2008  
Master (math.oec.diplom)

## Experiences

Training in **financial mathematics**: risk assessments, performance measurements and pricing replication, differential equations and Monte-Carlo simulations.  
Study minors: accounting, auditing, financing.



Specialist in **inter-disciplinary teams**: pivotal role in the experimental design(selection of experiments to perform) and the processing of the measurements.



One large project that lasted 9 years in the field of statistical physic. Resulted in three 80+ page articles and a 300 page thesis.



**General editor** and coordinator for a project that manages a website promoting research. We started the site 2016 and created a steady stream of articles& blogs since then.



**Developer** of simulations for models in statistical physics to numerically analyze them and create animation/visualization of these models [www.fitzner.nl/simulator](http://www.fitzner.nl/simulator).



Created and **lectured** bachelor and master courses with up to 80 students, most of them on financial mathematics.



**Supervision** of bachelor and master projects on topics of vector auto-regressive models, data analysis and machine learning



**Sailing** experience shore and offshore. Usually with a 4-8 men crew. I have been skipper for about half of the tours.



On the second page I give a brief overview of my larger projects.

# Robert@Fitzner.nl

I have worked on problems in various fields as probability theory, statistical physics, chemistry and mathematical finance. Here is an brief overview of my larger projects.

## Financial Mathematics

The major of my study was financial mathematics, quantitative finance. In my diplom/master's thesis I created a scheme to price derivate on traded stocks. The challenge thereby was to derive a pricing scheme when the trading strategies (used to hedge the option) are restricted. Since 2013 I regularly gave courses in financial mathematics treating topic such as asset pricing, risk and performance evaluation and fixed income streams.

## Projects with ICMS

In three projects I assisted chemists from the Institute for Complex Molecular Systems (ICMS) in their research. The common aim of these projects was to understand reactions between particles/proteins that can only be measured poorly due to their size or their concentration. To overcome this limitation I introduced a combination of simulation, mathematical modeling and experimentation design. Using this idea we could exclude conjectured mechanism and create evidence to the real workings of these systems. This idea of clever experimental design and simulation is an innovative and potent approach that we successfully used to analyze system relevant for the multiplication of DNA, infiltration of cell membranes and recombination of proteins.

## NoBLE project

In my PhD project I created a novel technique to analyze four standard models of statistical physics and solve a problem that remained unsolved for 20 years. This technique is a combination of perturbation theory, Fourier analysis, combinatorics and numerical validation. This project resulted in three 80+ page articles, which will be standard references for these model for the following decades. A summary can be found on [www.fitzner.nl/noble](http://www.fitzner.nl/noble).

## Simulation and mathematics

In two independent projects we derived mathematical results about two different models (random graphs and bootstrap percolation) describing how the model behave as they grow in size. Then, I used simulation of very large instance ( $10^9$  nodes for the graph) to numerically estimate the constants appearing in our mathematical results. These source code of the project can be found on my GitHub page [www.github.com/rfitzner/](https://www.github.com/rfitzner/).

## www.networkpages.nl

This website is an outreach project to promote research related to networks. I am a member of the executive board and have been crucial for the launch of the website. As one of the three general editors I coordinate and revise publications. Furthermore, I set up and am maintaining the back-end of the website. Additionally, I create interactive animation for the submitted articles, see [www.fitzner.nl/simulator](http://www.fitzner.nl/simulator).

## Causality, not correlation

Early 2018, we were approach by the Dutch Central office for Statistics (CBS) with the request to devise a technique to find the direction of a casual relations between multiple time series that in contrast to earlier approach should also work with relatively little data. In a small group we created a technique that is simple enough to be applied in practice and can effectively identify which signal is the cause and which is the effect (provided some knowledge of the signals).