

CO@Work 2015

Welcome

Thorsten Koch

Computing Exercises



Please download the Virtual Machine we have prepared.

Either from one of **the USB Sticks we pass around** or from the following URL

http://co-at-work.zib.de/files/COatWork_VM_64bit.ova

Installation instructions are given in this document: http://co-at-work.zib.de/files/install_VM.pdf

WLAN: Gast-im-ZIB

If you encounter problems, please ask us in the break at 10:30

Lunch / MensaCard



You will have the opportunity to buy a so-called “MensaCard” with which you can pay for your meals at the university cafeteria (“Mensa”).

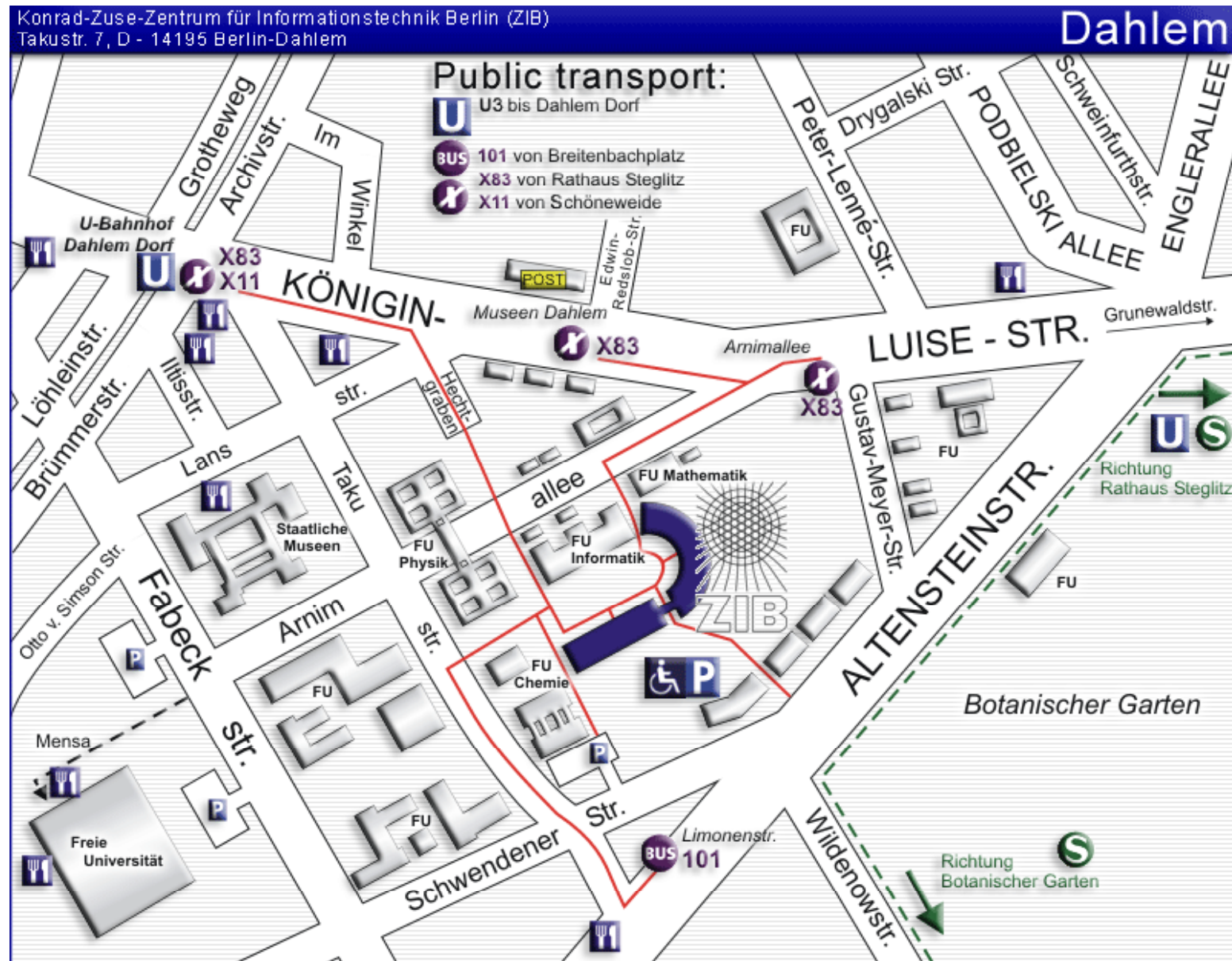
You can buy a MensaCard for € 5 (which includes a deposit of € 1.55 that you get back when you return the card and a credit of € 3.45 that you can use to pay for your first meal at the Mensa. There are a couple of machines where you can charge your card (up to an amount of € 50.00). Meals range from about € 0.50 for a small soup to about € 3-6 for a complete meal with side dish and dessert.

You cannot pay in cash at the Mensa. If you want to have your meals at the Mensa, you must get a MensaCard. Remember to bring your student pass with you, so that you can try to get your meals at the reduced student rate.

The Mensa is within walking distance to ZIB. In the area around U-Bahn station Dahlem-Dorf you can find several places where you can have lunch.

In detail, these are: a supermarket; a bakery; an asia fast food shop; a bagel, muffins, pasta, shop; a snack booth offering sausages, French fries, etc.; a döner kebab booth; a café within the building of the U-Bahn station; several restaurants (Italian, German, etc.), several cafeterias in museums and university institutes.

Mensa



- We intend to record all lectures on video.
- After post-processing, the videos of selected lectures will be made freely available in the Internet so that the participants, and in particular those who could not come, can watch (or re-use) the lectures.
- We will only record the lecturers, anyone in audience might only be briefly on the video by chance as part of the audience.
- If anybody want to ensure this does not happen, we have solution.
- The video team:
 - Wolfgang Dalitz
 - Lin Sternal
 - Tim Hasler
 - Gregor Hendel
 - Sven Helemann

Excursion on Wednesday 7.10.



RED TOUR

10:30 Bus departure from Berlin
14:00 DHL End of Runway
17:00 Dinner at Gosenschenke
08:30 DHL Express Hub
11:30 Return to Berlin

GREEN TOUR

09:00 Bus departure from Berlin
10:30 Bosch-Siemens (Nauen)
17:00 DHL End of Runway
19:00 Dinner at Gosenschenke
21:30 Return to Berlin

BLUE TOUR

09:00 Bus departure from Berlin
10:30 Bosch-Siemens (Nauen)
13:30 Bus from Nauen to Leipzig
15:30 DHL End of Runway
17:00 Return to Berlin

PURPLE TOUR

10:30 Bus departure from Berlin
14:00 Porsche
17:00 Return to Berlin

ORANGE TOUR

10:30 Bus departure from Berlin
14:00 Alte Spinnerei
17:00 Dinner at Gosenschenke
20:30 DHL Express Hub
23:30 Return to Berlin

GRAY TOUR

10:30 Bus departure from Berlin
14:00 Porsche
17:00 Dinner at Gosenschenke
21:30 Return to Berlin

Going back to Berlin takes approx. 2 h

Excursion on Wednesday 7.10.

Bus departure [Altensteinstraße 23](#), very close to ZIB. On Time!

Travel times Berlin → Leipzig: ~2h
 Berlin → Nauen: ~1h
 Nauen → Leipzig: ~2h

Food

- **There will be no opportunity to have lunch**
(except maybe at Bosch-Siemens), so bring your own!
- **Tours that are returning late to Berlin include dinner** at a traditional restaurant in Leipzig (pay yourself!)

Questions? Please send Email to <simon@zib.de>

Excursion on Wednesday 7.10.



- | | |
|--------------------------|--|
| Bosch-Siemens | Guided tour and presentation at the Bosch-Siemens Hausgeräte factory Nauen |
| DHL End of Runway | Guided tour through the new logistics center of DHL at Leipzig Airport |
| Porsche | Guided tour through the Porsche manufacturing unit |
| Alte Spinnerei | Guided tour through an old industrial area formerly used for cotton thread-twisting, now home to culture and arts |
| DHL Express Hub | Guided tour through the DHL Logistics Hub |
| Dinner | Opportunity to have dinner at a typical Saxonian restaurant in the center of Leipzig. Note: You have to pay yourself (~15-20€). There will be a selection of 3 dishes: pork / beef / vegan |

If you have time left



The **Technik Museum** <http://www.sdtb.de/Englisch.55.0.html>

They have very old Zuse Computers there (and a locomotive collection, and much more).

The society for exploration and documentation of subterranean architecture <http://berliner-unterwelten.de/home.1.1.html> has some interesting tours.

The **Museum of Natural History** <http://www.naturkundemuseum-berlin.de/en/> has biggest dinosaur skeletons and among many other things a large “wet” collection.

Save money on food, visit the Berlin **Museum of Medical History** at the Charité

<http://www.bmm-charite.de/en/index.html>

If you are interested in **palaces**: <http://www.spsg.de/schloesser-gaerten/objekt/schloss-charlottenburg-altes-schloss/> also there is of course Sanssouci in Potsdam.

Antiques can be found here <http://www.smb.museum/en/museums-and-institutions/altes-museum/home.html>

More **modern stuff** here <http://www.bauhaus.de/en/>

Something completely different

https://en.wikipedia.org/wiki/Soviet_War_Memorial_%28Treptower_Park%29 somehow

related to <https://en.wikipedia.org/wiki/Karl-Marx-Allee>

If you like **chocolate** you should visit Fassbender and Rausch <https://fassbender-rausch.de/>

and a more secret tip Hamann Dark Chocolate <http://hamann-schokolade.de/index.html>

Interesting links

Public transport: <http://www.bvg.de/en>

7-Day-Ticket Berlin AB € 29.50

If you are looking for concerts and events:

<http://www.tip-berlin.de/>

<http://www.zitty.de/>

Mathematical relevant

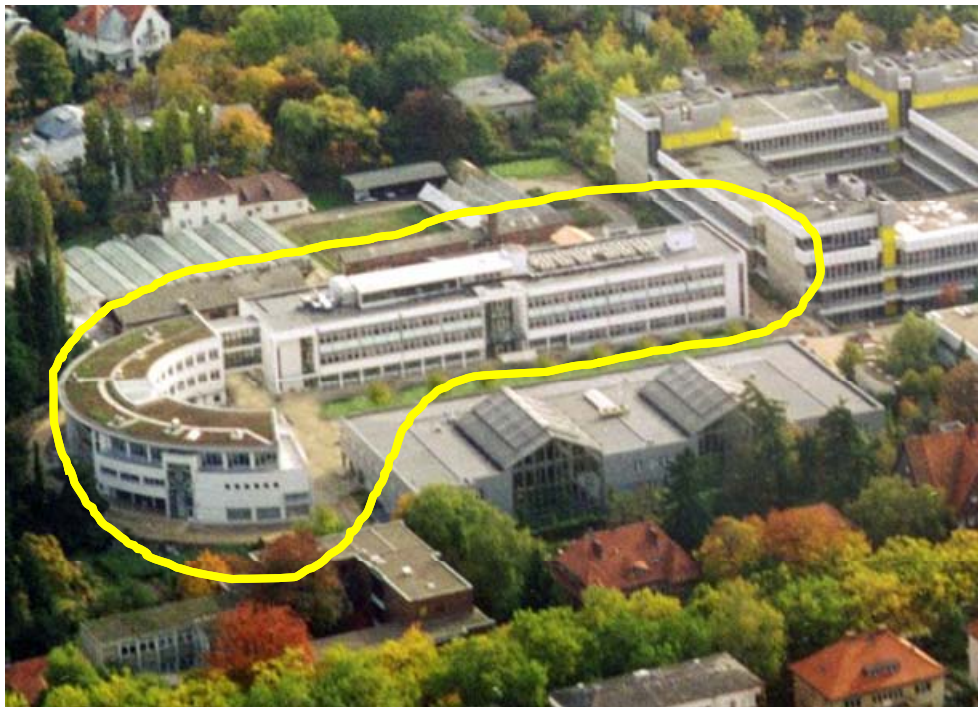
<http://www.zib.de>

<http://www.matheon.de>

<http://www.ecmath.de>

<https://www.math.tu-berlin.de/menue/home/parameter/en/>

Zuse Institut Berlin (ZIB)



The Zuse Institute Berlin is a research institute for applied mathematics and computer science.

Founded 1984 as a research institute of the state of Berlin, our research is driven by the principle

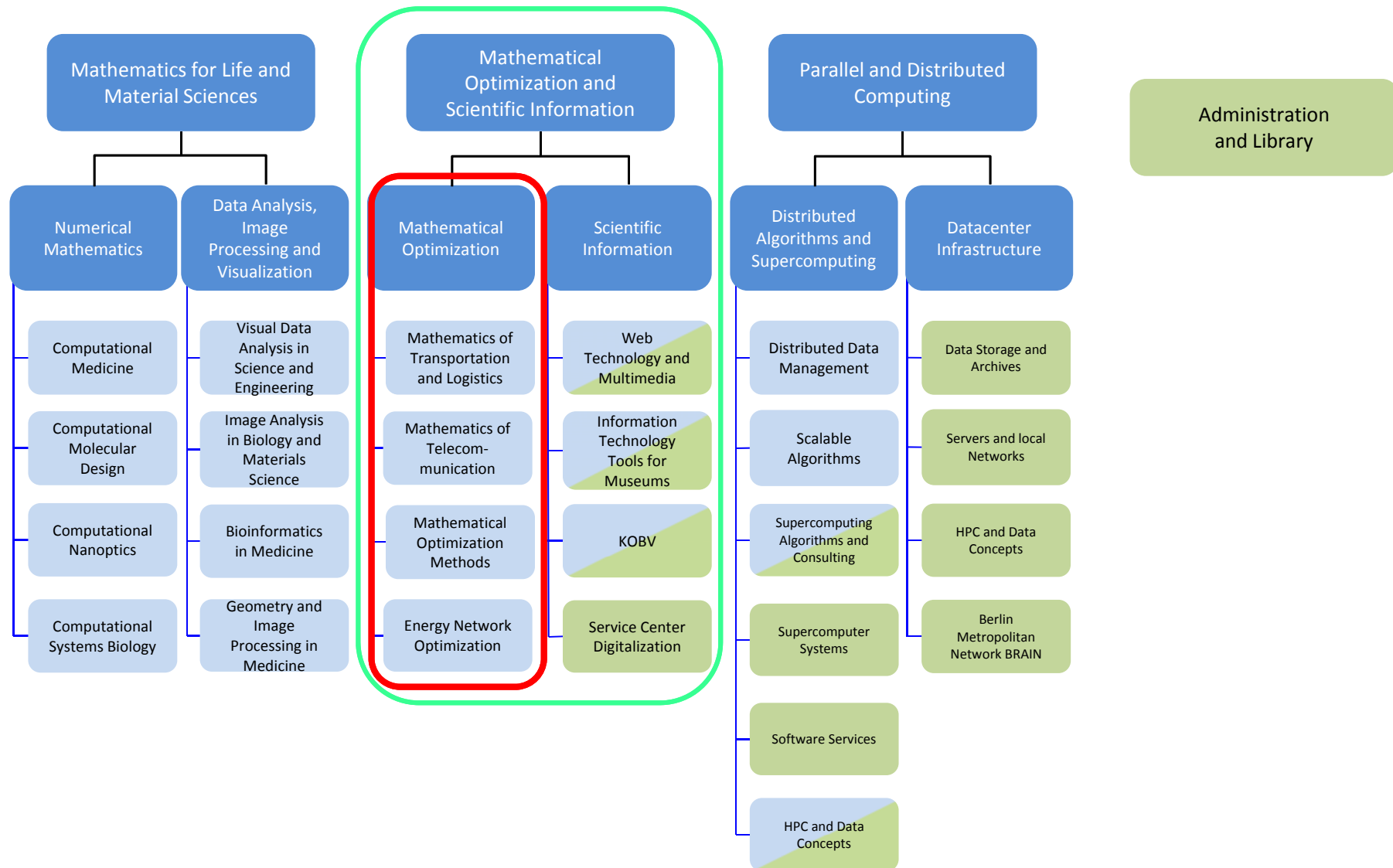
“Fast Algorithms - Fast Computers”

We provide solutions for complex problems in science, engineering, environment, and society:

Our goal is to solve problems that cannot be solved by current methods.

Current staff ~220, budget ~12 Mil € p.a.

ZIB Organization



Organizations Located and Operated at ZIB



HLRN – HochLeistungsRechenzentrum Nord

The North-German Supercomputing Alliance (HLRN), established in 2001, jointly operates a distributed supercomputer system hosted at ZIB in Berlin and RRZN in Hannover.

The new HLRN-III Cray XC30 System has in total 17,856 cores and 47.6 TB memory. The operating system is SLES 11.3.



BRAIN – Berlin Research Area Information Network

BRAIN is the high speed metropolitan data network of the scientific and research institutions in Berlin. It connects more than 40 institutions at over 150 locations with the German National Research and Education Network X-WiN.



KOBV – Cooperative Library Network Berlin-Brandenburg

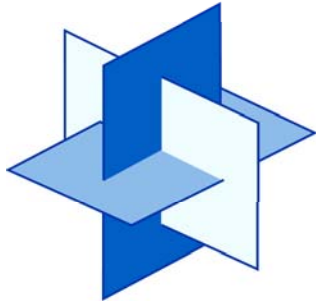
The KOBV is the common platform of all university libraries and public libraries and numerous research, special and government libraries in Berlin and Brandenburg.



digiS – Service Center Digitization Berlin

The Service Center for Digitization Berlin (digiS) is a project to coordinate and support digitization efforts of cultural assets in museums, libraries, and archives in the city state of Berlin.

DFG Research Center MATHEON – *Mathematics for Key Technologies*



MATHEON is a center for application-driven mathematical research funded in 2002 by the German Research Foundation DFG and located in Berlin, Germany

Initial funding 12 years 4 Mio € p.a.



Technical University
of Berlin



Free University
of Berlin



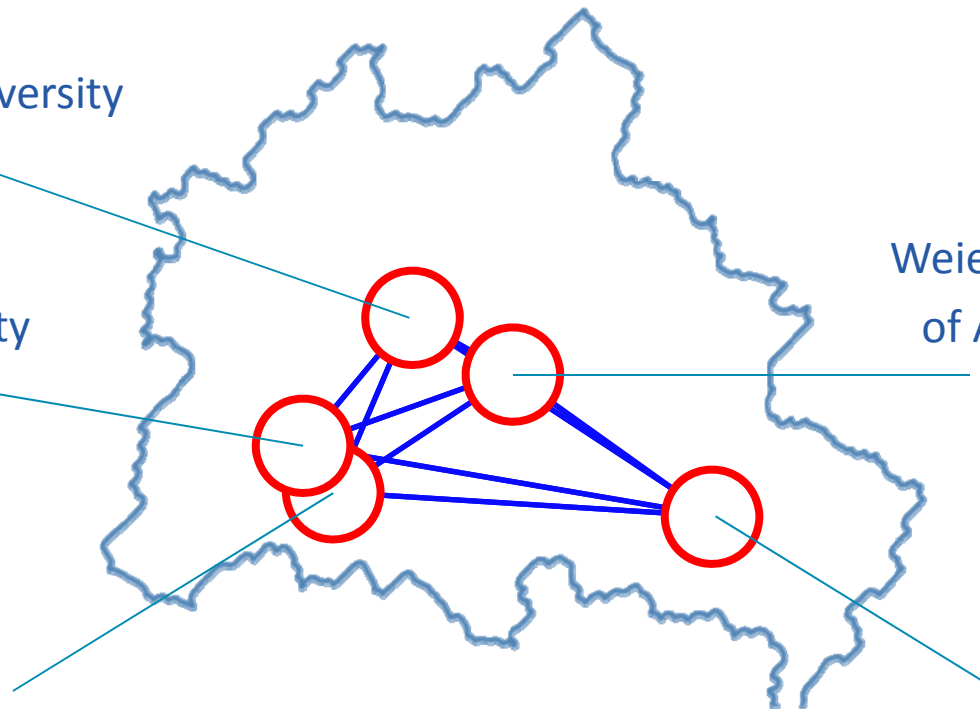
Zuse Institute Berlin



Weierstrass Institute
of Applied Analysis
and Stochastics



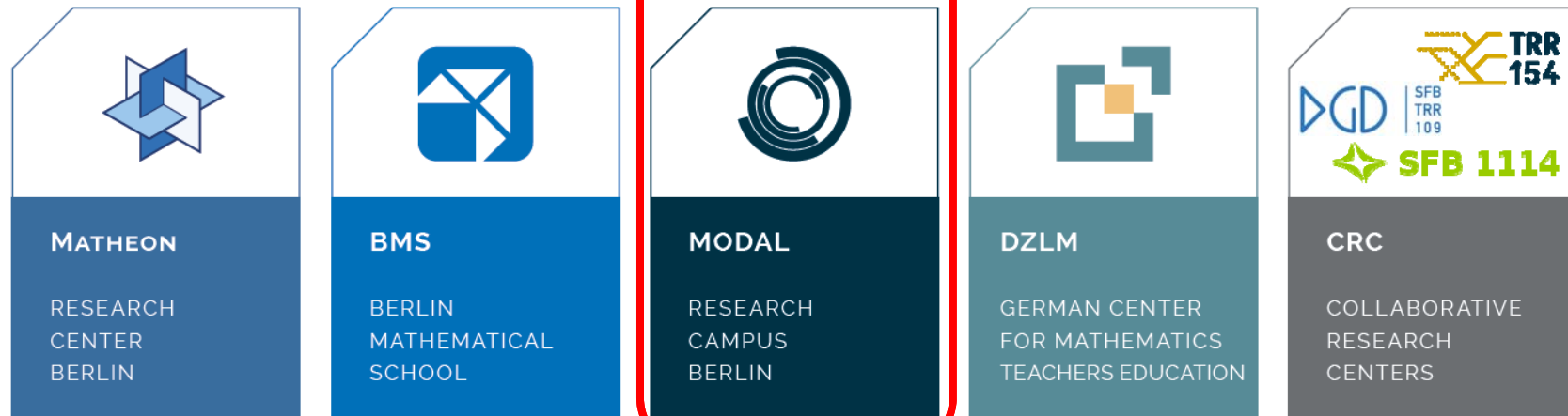
Humboldt University
of Berlin



~50 full professors
+ ~190 scientists

MATHEON – Application Areas





 **ECMath**
Einstein Center
for Mathematics Berlin



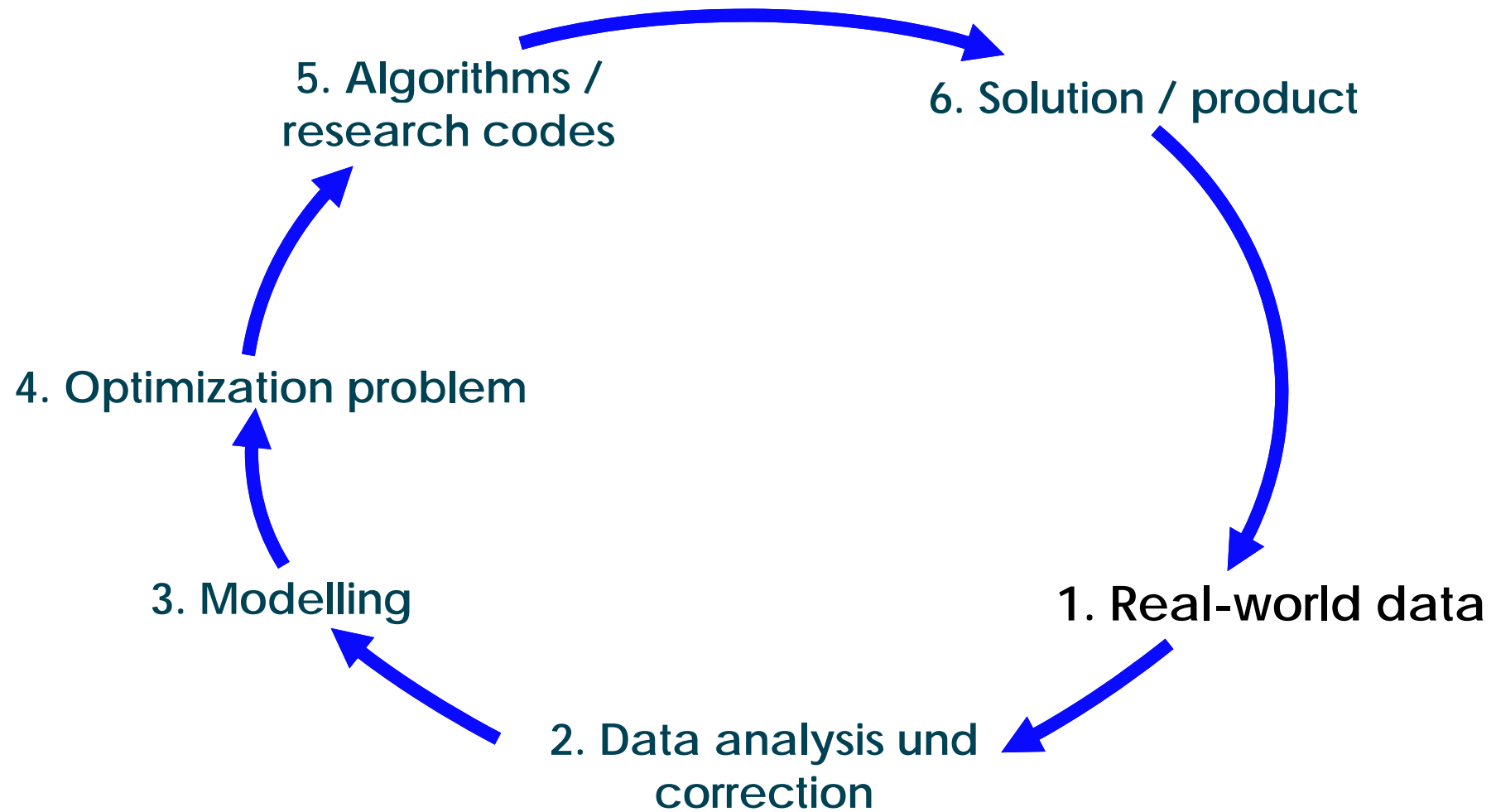
**Bundesministerium
für Bildung
und Forschung**

**FORSCHUNGS
CAMPUS**

öffentlich-private Partnerschaft
für Innovationen



Mathematical Optimization and Data Analysis Laboratories





RailLab

Day precision, robust,
supply-oriented
circulation planning



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Thorsten Koch



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RailLab

Day precision, robust,
supply-oriented
circulation planning





GasLab

Robust and efficient
control of gas
networks



Open Grid Europe
The Gas Wheel



BahnLab

Day precision, robust,
supply-oriented
circulation planning

GasLab

Robust and efficient
control of gas
networks





MedLab

New diagnostics –
math. analysis of
medical mass data



BahnLab

Day precision, robust,
supply-oriented
circulation planning

GasLab

Robust and efficient
control of gas
networks



MODAL
FORSCHUNGSCAMPUS

MedLab

New diagnostics –
math. analysis of
medical mass data



Freie Universität  Berlin

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SynLab
Technology basis
discrete-continuous
stochastic optimization

Thorsten Koch

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BahnLab

Day precision, robust,
supply-oriented
circulation planning

GasLab

Robust and efficient
control of gas
networks



MODAL
FORSCHUNGSCAMPUS

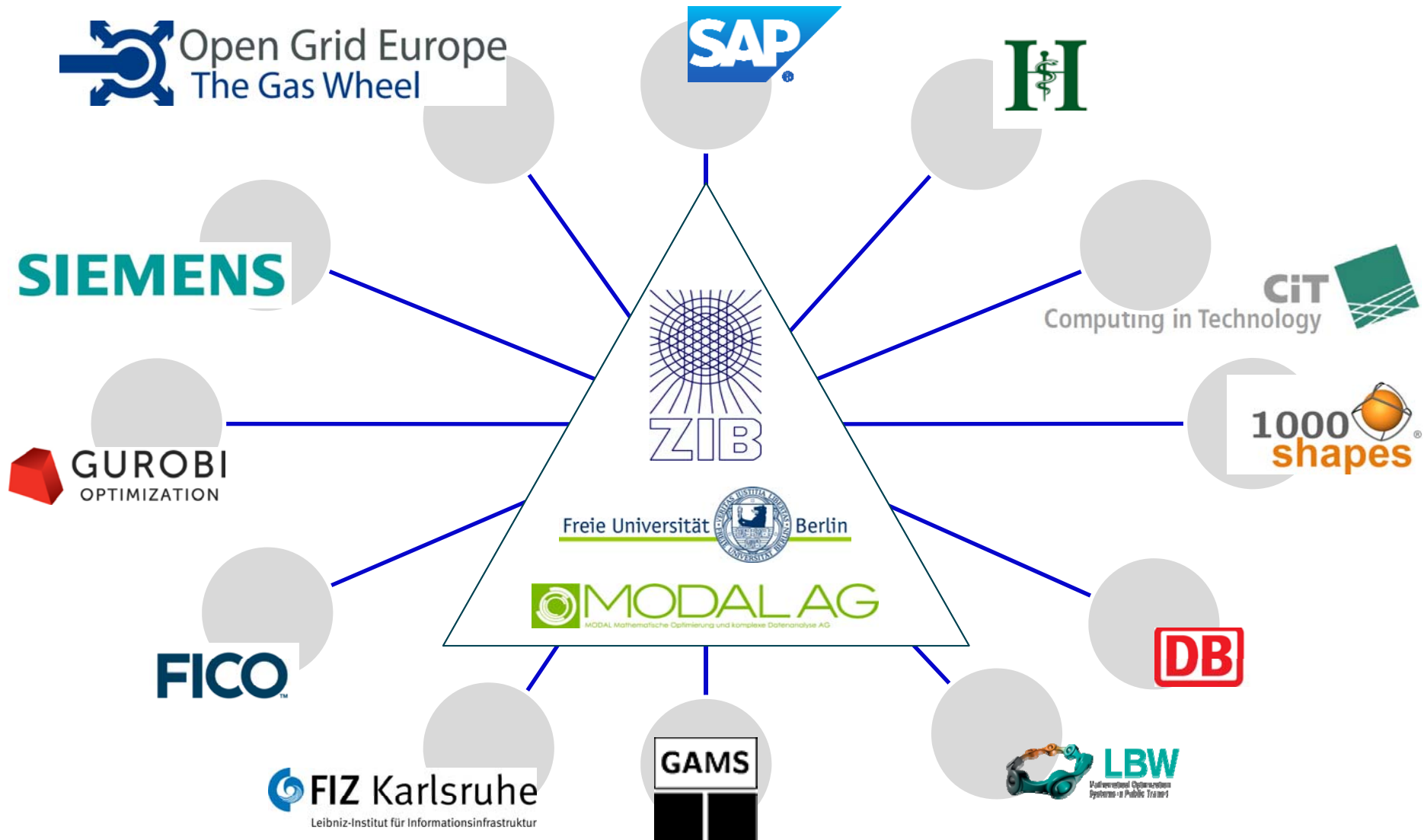
MedLab

New diagnostics –
math. analysis of
medical mass data

SynLab

Technology basis
discrete-continuous
stochastic optimization

Bilateral Partnerships – homogeneous Frame



The program

Mo	Basic theory and getting software to run
Tu	Introduction to modeling and polyhedral investigations
We	Programming with SCIP and applications in Telecommunications
Th	Applications in Gas transportation
Fr	Overview on Applications, GAMS, and Graph 500
Sa	Applications in Traffic
So	Free
Mo	Linear and Integer Optimization
Tu	CPLEX, Gurobi, and XPRESS
We	Excursion to Leipzig
Th	Mixed Integer Non-linear Programming
Fr	Selected Applications
Sa	Examination

Our guest lecturers (in order of appearance)

- Christina Burt (University of Melbourne)
- Michael Joswig (TU Berlin)
- Katsuki Fujisawa (Kyushu University)
- Robert Bixby, Tobias Achterberg (Gurobi)
- Daniel Junglas, Domenico Salvagnin (IBM)
- Pietro Belotti (FICO)
- Pierre Bonami (Aix Marseille Université)
- Hayato Waki (Kyushu University)
- Joachim Dahl (MOSEK)
- Alexander Martin (University of Erlangen)
- Johannes Bisschop (LiTiC)
- Florian Seipp, Martin Seydenschwanz (Siemens)

Todays program

Monday, 28.09.2015		
08:00		Registration (ZIB Foyer)
09:00	Martin Grötschel, Thorsten Koch	Welcome
09:30	Martin Grötschel	Lecture: Linear and Mixed Integer Optimization: The Solution Methods - just a glimpse
11:00	Martin Grötschel	Basics of Polyhedral Theory, Flows, and Networks
14:00	Matthias Miltenberger	Lecture and Demo: Introduction to SCIP
15:15	Benjamin Müller	Lecture: Refreshing C for SCIP
16:30	Thorsten Koch	Data Experiment
18:00		Welcome Reception with BBQ

Let us start!

The program



Tuesday, 29.09.2015

09:00	Stephen Maher	Lecture: Modelling Basics and Tricks, Introduction to the Equitable Coach Problem
09:30	Stephen Maher	Modelling Exercise: The Equitable Coach Problem (Problem Formulation)
10:00	Christina Burt, Jakob Witzig	Lecture: Overview of Modelling Languages, Getting started with ZIMPL
10:30	Christina Burt, Jakob Witzig	Modelling Exercise: The Equitable Coach Problem (Implementation in ZIMPL)
11:30	Christina Burt	Lecture: Modelling Reformulations
12:00	Jakob Witzig	Modelling Exercise: The Equitable Coach Problem (Implementation in SCIP)
13:30	Michael Joswig	Polymake