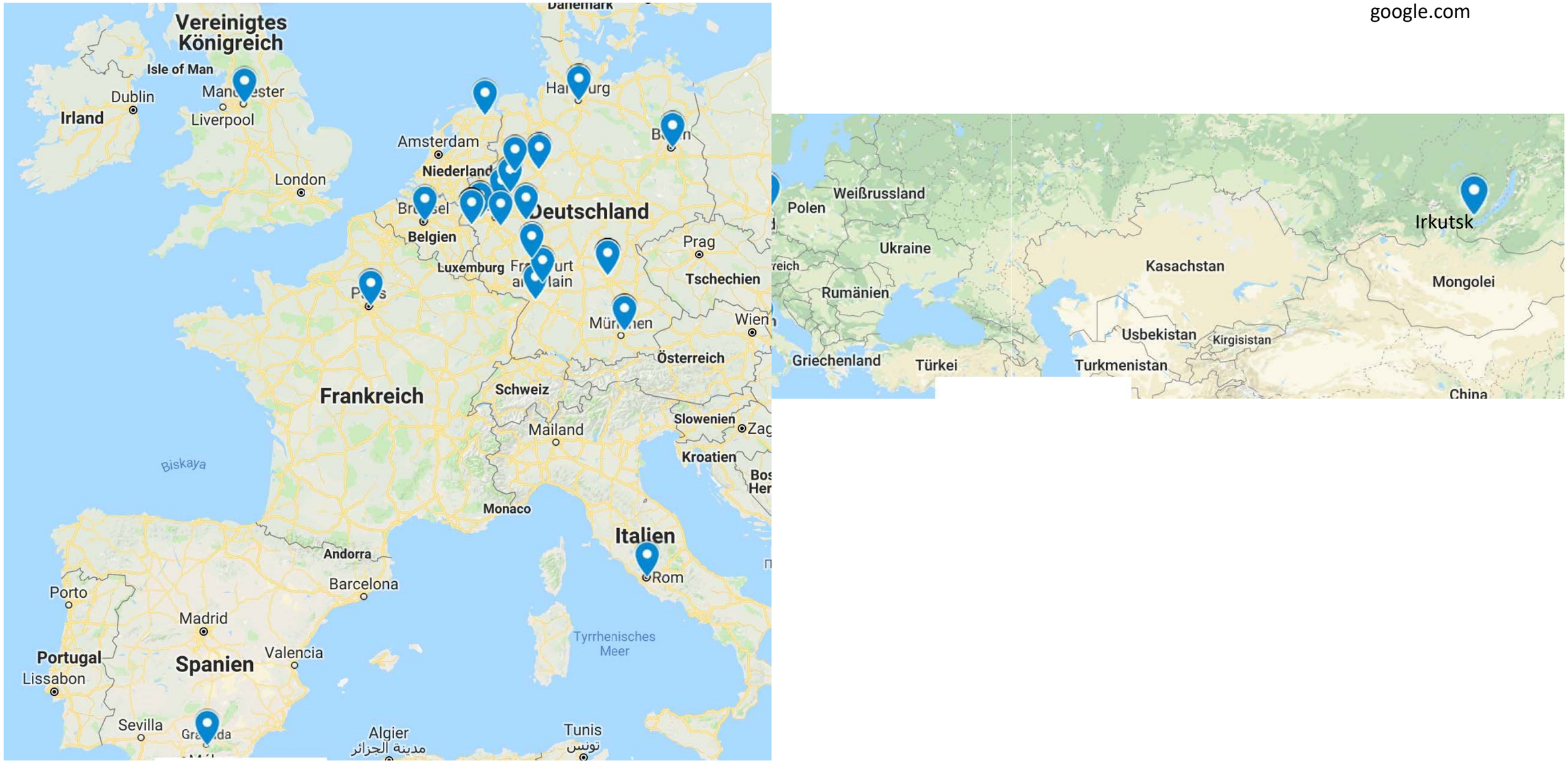
Welcome! Big Data Science in Astroparticle Research



google.com

Martin Erdmann, Andreas Haungs

WLAN access

Eduroam

Guests without Eduroam use `MOPS‘

Connect to WiFi network "RWTH-guests"

Login: BDSAR

Password: mifjlev

Martin Erdmann, Andreas Haungs

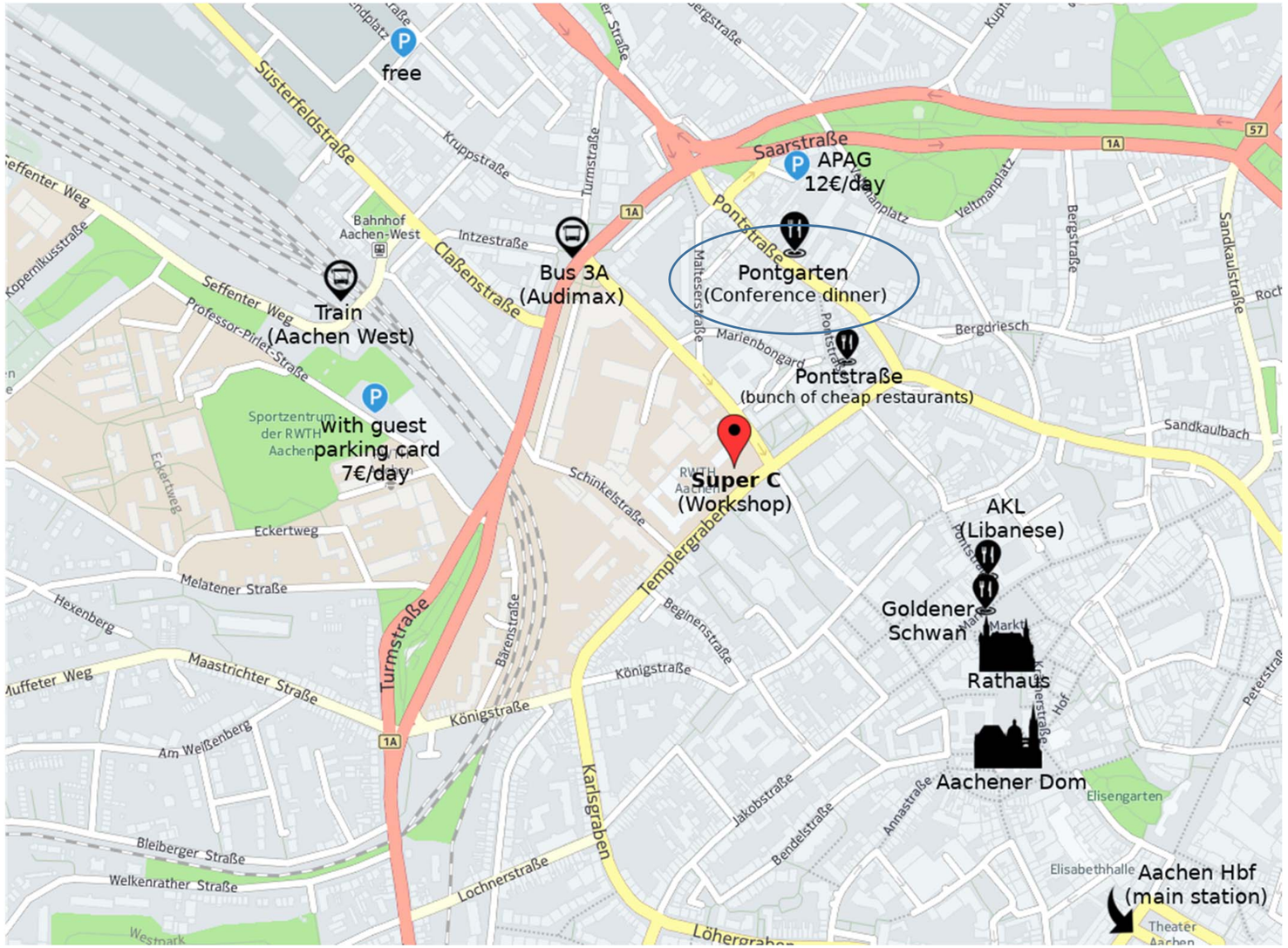
Coffee, eat

Yes, we‘ll have coffee breaks 

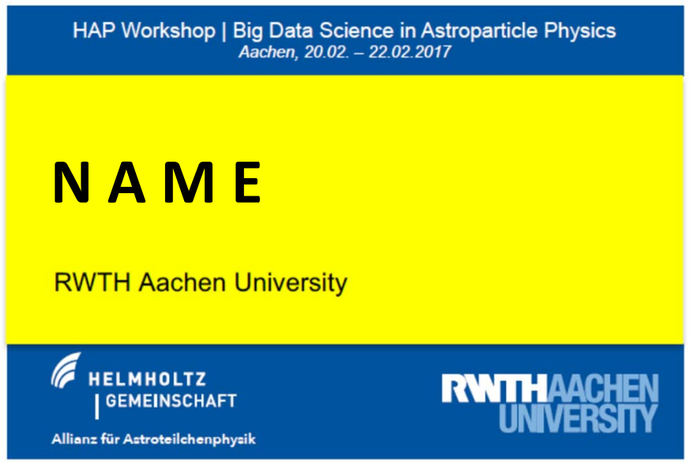
18-Feb Dinner of your choice

19-Feb Lunch of your choice

19-Feb Conference Dinner 



Local organization



Workshop organizers: Martin Erdmann, Jonas Glombitza, Andreas Haungs, Yannik Rath, Marcus Wirtz

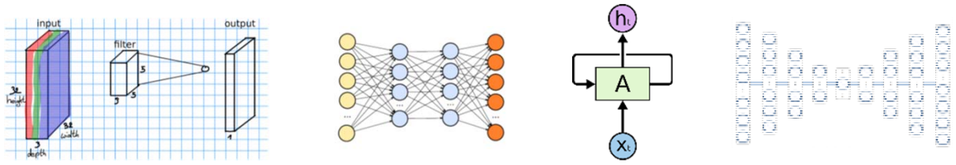
Reception desk: Sabine Bucher, Melanie Roder

VISPA for tutorial: Benjamin Fischer, Niclas Eich, Dennis Noll, Peter Fackeldey, and more

1st Workshop 20.-22. Feb-2017

Deep Learning

Network concepts & applications



Supervised machine learning

Tutorial: fully connected, convolutional

Open Data

Existing: The Virtual Observatory (Astronomy)

KCDC Kascade data preservation & publication

Future: Big data challenges in radio astronomy (SKA)

BMBF: Accelerating the Digital Transformation in Science → *message: do it!*

Evaluation

Discussion on future

Meet again in 1 year (today!)
Reputation of Software work
…

2nd Workshop 19.-21. Feb-2018

Deep Learning

- Supervised & unsupervised machine learning
- Causality & stability of networks
- Network training with simulations ≠ data

Tutorial: 14:15 basics & convolutional, 16:15 adversarial

Open Data

Projects envisioned

- National initiatives: research data alliance, data center, application for funds
- International: initiatives in United Kingdom

Evaluation: Tuesday 16:00

Discussion on future: Wednesday

lots of discussions & initiatives happend in 2017

3rd Workshop 18.-20. Feb-2019

Deep Learning

- Deep learning publications from all astroparticle experiments!
- Mathematics & Informatics on machine learning

Tutorial: 14:15
Information Field Theory

16:15 advanced IFT

vis-à-vis

Tutorial: 16:15 deep learning for beginners

Open Data

- Value of data: metadata, curation, combination
- nationale Forschungsdateninfrastruktur (NFDI)

  = national research federated infrastructure
- Digitization: Statement of the Universe & Matter Community to the BMBF

Evaluation: Tuesday 16:00

Discussion on future: Wednesday

(lots of discussions & initiatives in 2017/2018)

Workshop Program

	Date		Title	Presenter
Machine Learning	Monday	14:00	Welcome and organizational matters	Prof. Martin Erdmann
	Monday	14:10	Introduction tutorial to Information Field Theory and Exercises	Prof. Torsten Enßlin
	Monday	16:15	Introduction tutorial to Information Field Theory and Exercises	Prof. Torsten Enßlin
	Monday	16:15	Beginners Tutorial Deep Networks: Introduction	Mr. Jonas Glombitza
	Tuesday	09:00	Welcome at the RWTH Aachen University	Prof. Dr. Carsten Honerkamp
	Tuesday	09:19	Deep Neural Networks for Energy and Position Reconstruction in EXO-200	Mr. Tobias Ziegler
	Tuesday	09:38	A Deep Neural Network for Pixel-Level Electromagnetic Particle Identification in the MicroBooNE Lar TPC	Mr. Davide Porzio
	Tuesday	09:57	Deep learning techniques applied to the physics of extensive air showers	Mr. Juan Miguel Carceller
	Tuesday	10:16	Inspection of the AIXNET network for air shower reconstruction	Mr. Niclas Eich
	Tuesday	11:05	Application of Deep Learning methods to analysis of Imaging Atmospheric Cherenkov Telescopes data	Mr. Matthias Büchele
	Tuesday	11:24	Recovery of Radio Signals from Cosmic Ray Induced Air Showers with Deep Learning	Mr. Felix Schlüter
	Tuesday	11:43	Reconstruction of air-shower radio pulses from real Tunka-Rex background with autoencoder network	Mr. Pavel Bezyazeekov
	Tuesday	12:02	Event classification in Compton-Pair telescopes using Deep Learning Techniques	Mr. Jan Peter Lommler
	Tuesday	12:21	Cascade Reconstruction in IceCube using Generative Networks	Mr. Mirco Muennefeld
	Tuesday	12:40	Precise simulation of electromagnetic calorimeter showers using a Wasserstein Generative Adversarial Netv	Mr. Thorben Quast
	Tuesday	14:30	Deep Learning and Mathematical Modeling: Taking the Best out of Both Worlds	Prof. Gitta Kutyniok
	Tuesday	15:10	Contracting alignment patterns of mixed composition nuclei	Mr. Marcus Wirtz
	Tuesday	15:30	Exploring Optical Properties of Antarctic Ice with IceCube Using Gradient Descent	Mr. Alexander Harnisch
	Tuesday	16:00	Evaluation	
	Tuesday	16:20	Data Science in Astroparticle Physics	Dr. Tim Ruhe
	Tuesday	17:00	Bayesian reconstruction of the cosmic Dark Matter velocity field	Dr. Florian Führer
	Tuesday	17:20	Autonomous Physics-Inspired Feature Engineering	Mr. Marcel Rieger
	Tuesday	17:40	Exploring Antarctic Ice Properties Using Generative Neural Networks	Mr. Sebastian Bange
	Tuesday	19-22	Workshop Dinner Pontgarten	
Open Data	Wednesday	09:00	The ESCAPE project and the EOSC	Dr. Kay Graf
	Wednesday	09:40	CTA Software and Science Data Management	Dr. Igor Oya
	Wednesday	10:20	Open high-level data and tools for gamma-ray astronomy	Dr. Christoph Deil
	Wednesday	11:10	Data engineering for joint analysis of different astroparticle data in KRAD project	Mrs. Victoria Tokareva
	Wednesday	11:30	Challenges and Opportunities of Digital Transformation in Fundamental Research on Universe and Matter	Dr. Andreas Haungs
	Wednesday	12:00	Discussion on Big Data Science in Astroparticle Research	Erdmann, Haungs