FrontUQ 2017

Frontiers of Uncertainty
Quantification in Engineering

Conference Program and Guidelines

5 – 8 September 2017
Munich, Germany

Technische Universität München

Locations

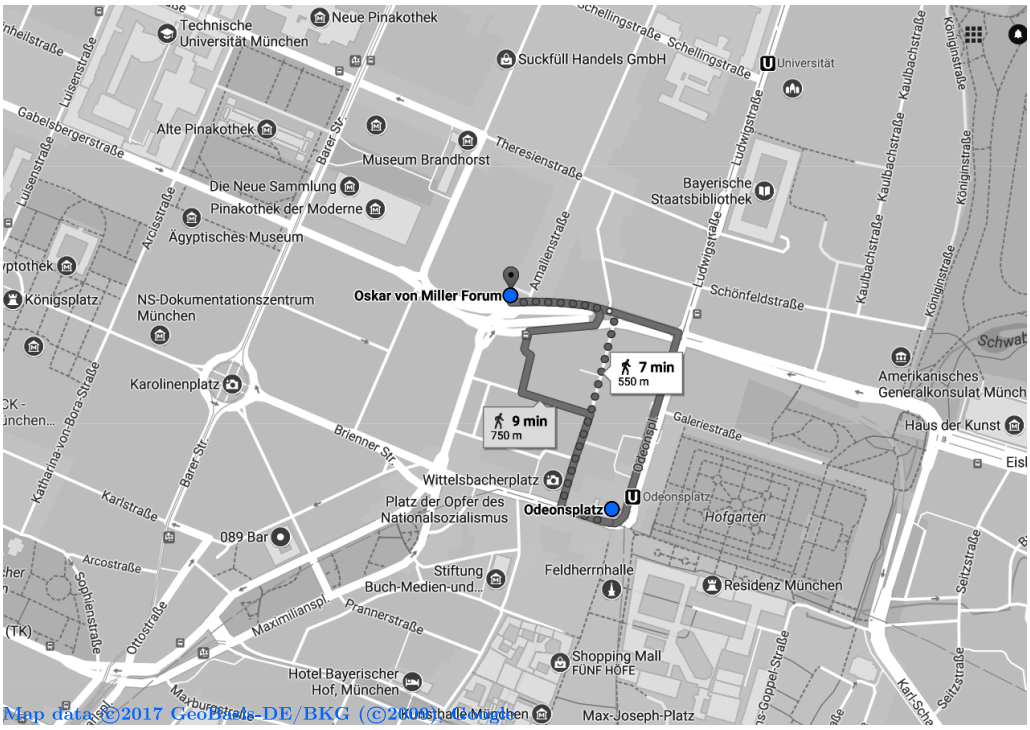
Venue

- FrontUQ 2017 will take place in the heart of Munich at the

  Oskar von Miller Forum
  Oskar-von-Miller-Ring 25, 80333 München

- By public transportation:
  From the Airport take S-Bahn S8 to *Marienplatz*, and from there take the metro line U3 or U6 in the direction *Münchner Freiheit* to *Odeonsplatz*. The estimated travel time is about 50 minutes.

  The closest metro station is *Odeonsplatz* which can be reached with metro lines U3, U4, U5 and U6. The walking distance from *Odeonsplatz* to the Oskar von Miller Forum is approximately 5 min.



Short course

- The course will take place in the

  Herbert Kupfer Saal
  Building N6, 1st Floor
  Theresienstr. 90, 80333 München

- Directions from the *Oskar von Miller Forum* to the *Herbert Kupfer* room.

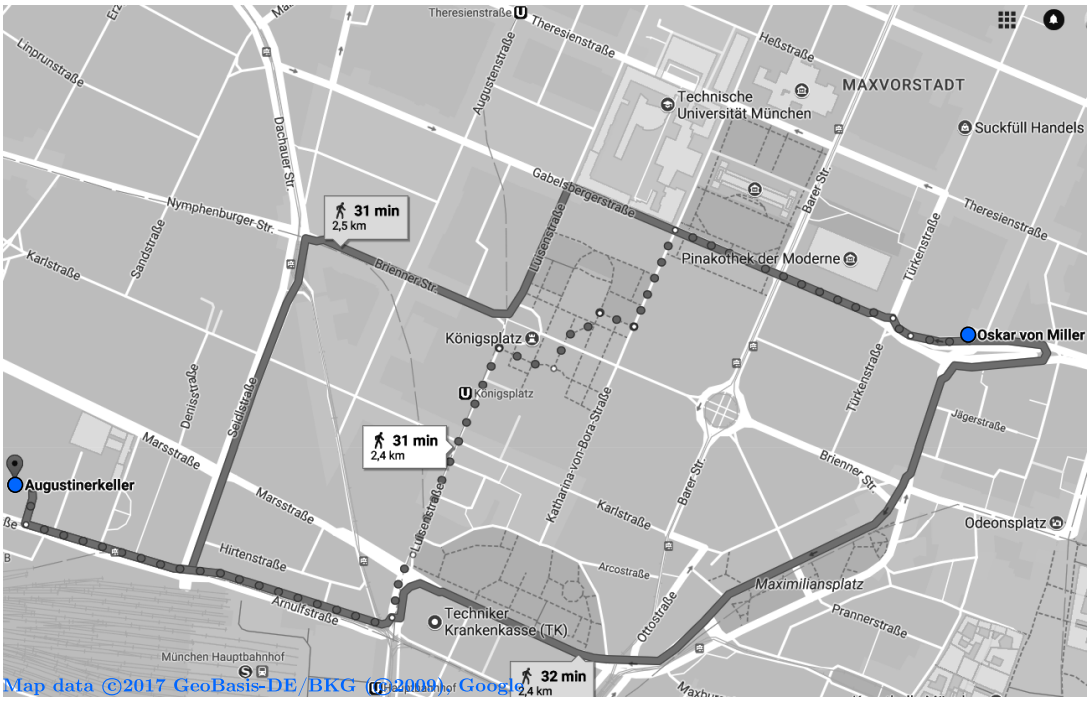
Conference dinner

- The conference dinner will take place on **Thursday, September 7 19:30–23:30** in *Augustiner-Keller*, a restaurant known for its large beer garden and hall, serving Bavarian and international dishes.

  Augustiner-Keller München
  Arnulfstr. 52, 80335 München
  www.augustinerkeller.de

- By public transportation:
  U1, U2, U4 or U5, *Hauptbahnhof* station.
  S1-S8, *Hauptbahnhof* or *Hackerbrücke* stations.
  Tram 16 or 17, *Hopfenstraße* station.

- Directions from the *Oskar von Miller Forum* to the *Agustiner-Keller* beer garden.



Program overview

General schedule

<table>
<tr><th></th><th>Tuesday
Sept. 05</th><th>Wednesday
Sept. 06</th><th>Thursday
Sept. 07</th><th>Friday
Sept. 08</th></tr>
<tr><td>08:00 - 08:30</td><td rowspan="5"></td><td>Registration</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>08:30 - 08:40</td><td>Welcome</td></tr>
<tr><td>08:40 - 09:30</td><td rowspan="2">Technical session</td><td rowspan="2">Technical session</td><td rowspan="2"></td></tr>
<tr><td>09:30 - 10:20</td><td>Technical session</td></tr>
<tr><td>10:20 - 10:50</td><td colspan="3">Coffee</td></tr>
<tr><td>10:50 - 12:30</td><td></td><td>Technical session</td><td>Technical session</td><td>Technical session</td></tr>
<tr><td>12:30 - 14:00</td><td colspan="3">Lunch</td></tr>
<tr><td>14:00 - 15:40</td><td rowspan="3">Short Course</td><td>Technical session</td><td>Technical session</td><td>Technical session</td></tr>
<tr><td>15:40 - 16:10</td><td colspan="2">Coffee</td><td>Closing</td></tr>
<tr><td>16:10 - 17:50</td><td>Poster Session</td><td>Technical session</td><td rowspan="2"></td></tr>
<tr><td></td><td>Icebreaker</td><td></td><td>Dinner</td></tr>
</table>

Detailed schedule

Day 1: Tuesday, September 5

Tuesday, September 5: Herbert Kupfer Saal
Short Course

1. 14:00–15:30: **Catherine Powell**.
   Incorporating uncertainty into PDE models in engineering applications.

15:30–16:30: Coffee break

Tuesday, September 5: Herbert Kupfer Saal
Short Course

1. 16:30–18:00: **Catherine Powell**.
   Reduced basis methods for parameter-dependent PDEs.

From 19:00-21:30:
Conference 'icebreaker' at the *Roof Garden* of the *Oskar von Miller Forum*

Day 2: Wednesday, September 6

08:00–08:30: **Registration**

08:30–08:40: **Welcome** (Elisabeth Ullmann)

Wednesday, September 6: Oskar von Miller Forum
8:40–10:20: *Keynotes*
Chair: Barbara Wohlmuth

1. 08:40–09:30: **J. Tinsley Oden**.
   OPAL – A Bayesian framework for model selection, validation and for prediction in the presence of uncertainty.
2. 09:30–10:20: **Costas Papadimitriou**.
   Challenges in Bayesian uncertainty quantification and propagation for structural dynamics simulations.

10:20–10:50: Coffee break

Wednesday, September 6: Oskar von Miller Forum
10:50–12:30
Chair: Martin Eigel

1. 10:50–11:10: **Isabell Franck**, P.-S. Koutsourelakis.
   Beyond a black box: model error quantification for high-dimensional, Bayesian inverse problems.
2. 11:10–11:30: **Loic Giraldi**, O. Le Maître, I. Hoteit, O. Knio.
   Optimal reduction of observations for Bayesian inference.
3. 11:30–11:50: **Tom Lahmer**, L. Nguyen-Tuan, A. Schmidt, M. Alalade.
   Solving inverse problems under uncertainty.
4. 11:50–12:10: M. Iglesias, Z. Sawlan, **Marco Scavino**, R. Tempone, C. Wood.
   Bayesian techniques for parameter estimation in linear PDEs with noisy boundary conditions.
5. 12:10–12:30: **Pushkar Kumar Jain**, K. Mandli, I. Hoteit, O. Knio, C. Dawson.
   Dynamically adaptive data-driven simulation of extreme hydrological flows.

12:30–14:00: **Lunch break**

Wednesday, September 6: Oskar von Miller Forum
14:00–15:40
Chair: Marco Broccardo

1. 14:00–14:20: **Michael Shields**, D. Giovanis.
   A Grassmann manifold-based adaptive sampling method.
2. 14:20–14:40: **Emiliano Torre**, S. Marelli, P. Embrechts, B. Sudret.
   Modeling high-dimensional inputs with copulas for uncertainty quantification problems.
3. 14:40–15:00: **Karl Breitung**.
   Numbers or structures: on the futures of structural reliability?

4. 15:00–15:20: **Niklas Miska**, S. Prüger, D. Balzani.
   Quantification of uncertainty resulting from microstructure morphology variation based on statistically similar representative volume elements.
5. 15:20–15:40: **Robert Gruhlke**.
   Multi-scale failure analysis with polymorphic uncertainties for optimal design of rotor blades.

15:40–16:10: Coffee break

Wednesday, September 6: Oskar von Miller Forum
16:10–17:50: Poster Blitz and Poster Session
Chair: Iason Papaioannou

1. **Elizabeth Bismut**, D. Straub.
   Inspection and repair of deteriorating structural systems: policy optimization with a heuristic approach.
2. **Chen Chen**.
   A comparison between intrusive and non-intrusive spectral projection method with implementation on shallow water system.
3. **Marco Daub**.
   Uncertainty reduction for complex systems with higher dimensional decomposed, optimal solution spaces.
4. **Max Ehre**, I. Papaioannou, D. Straub.
   Bayesian updating of rare events with meta model-based reliability methods.
5. **Hector Diego Estrada**, E. Patelli.
   Risk assessment with enhanced Bayesian network: application to hydropower station.
6. **Sebastian Geyer**, I. Papaioannou, D. Straub.
   Cross entropy-based importance sampling in low and high dimensions with a new mixture model.
7. **Constantin Grigo**, P.-S. Koutsourelakis.
   Probabilistic reduced-order modeling for stochastic partial differential equations.
8. **Amir Sagiv**, G. Fibich, A. Ditkowski.
   Interpolative approach to UQ of non-smooth random quantities in the nonlinear Schrodinger equation.
9. **Kenan Sehic**, H. Bredmose, M. Karamehmedovic.
   Uncertainty quantification for a stochastic linear water wave model.
10. **Felipe Uribe**, I. Papaioannou, W. Betz, D. Straub.
    Transdimensional MCMC algorithms for Bayesian inference of random fields.

Day 3: Thursday, September 7

Thursday, September 7: Oskar von Miller Forum
8:40–10:20: Keynotes
Chair: Daniel Straub

1. 08:40–09:30: **Dongbin Xiu**.
   Sequential approximation algorithms for big data.
2. 09:30–10:20: **Lori Graham-Brady**.
   The role of stochastic simulation in mechanics of materials at multiple scales.

10:20–10:50: Coffee break

Thursday, September 7: Oskar von Miller Forum
10:50–12:30
Chair: Steven Mattis

1. 10:50–11:10: **Martin Eigel**.
   Stochastic topology optimization with hierarchical tensor reconstruction.
2. 11:10–11:30: **Dimos Charmpis**.
   Computationally efficient handling of successive analyses required in structural design optimization under uncertainty.
3. 11:30–11:50: **Matthieu Martin**.
   Risk average optimal control problem for elliptic PDEs with uncertain coefficients
4. 11:50–12:10: **A. Kodakkal**, A.Ghantasala, M.Andre, R.Wüchner, K.-U.Bletzinger.
   Two step uncertainty quantification using gradient enhanced stochastic collocation for geometric uncertainties.
5. 12:10–12:30: A. Eggels, **Daan Crommelin**.
   A clustering method for uncertainty propagation with dependent inputs.

12:30–14:00: **Lunch break**

Thursday, September 7: Oskar von Miller Forum
14:00–15:40
Chair: Sebastian Ullmann

1. 14:00–14:20: **Daniel Walter**.
   A sparse control approach to optimal design of experiments for PDEs.
2. 14:20–14:40: **Laurence Cook**, J. Jarrett, K. Willcox.
   Generalized information reuse for optimization under uncertainty of non-sample average metrics.
3. 14:40–15:00: **Andreas van Barel**, S. Vandewalle.
   Robust optimization of PDE constrained systems using a multilevel Monte Carlo method
4. 15:00–15:20: **Friedrich Menhorn**, Y. Marzouk.
   Derivative-free stochastic constrained optimization using Gaussian processes, with application to a scramjet.
5. 15:20–15:40: **Sebastian Thelemann**, P. Lozano, M. Pabst, F. Duddeck.
   Evaluation of different robustness measures for crashworthiness problems.

15:40–16:10: Coffee break

Thursday, September 7: Oskar von Miller Forum
16:10–17:50
Chair: Björn Sprungk

1. 16:10–16:30: **Marco Broccardo**, A. Mignan, S. Wiemer, B. Stojadinovic.
   A hierarchical Bayesian framework for modeling induced seismicity hazard associated with deep underground fluid injection.
2. 16:30–16:50: M. Eigel, **Manuel Marschall**, R. Schneider.
   Sampling-free Bayesian inversion with adaptive hierarchical tensor representation.
3. 16:50–17:10: **Steven Mattis**.
   Measure-theoretic stochastic inversion of groundwater problems
4. 17:10–17:30: **Sheri Martinelli**, A. Wixom, M. Shepherd, S. Hambri, R. Campbell.
   Impacts of forcing due to turbulent boundary layer uncertainty on modal response functions in structural acoustics.
5. 17:30–17:50: **Laurent van den Bos**, B. Sanderse.
   Fast Bayesian model calibration by using non-intrusive interpolating surrogate methods.

19:30–23:30
Conference Dinner

Day 4: Friday, September 8

Friday, September 8: Oskar von Miller Forum
9:30–10:20: Keynote
Chair: Iason Papaioannou

1. 09:30–10:20: **Olivier Le Maître**.
   A domain decomposition method for stochastic elliptic differential equations.

10:20–10:50: Coffee break

Friday, September 8: Oskar von Miller Forum
10:50–12:30
Chair: Elisabeth Ullmann

1. 10:50–11:10: **Sebastian Ullmann**, J. Lang.
   CFD under uncertainty: combining model order reduction with spatial adaptivity.
2. 11:10–11:30: **Carlos Jerez-Hanckes**, P. Escapil-Inchauspé.
   Wave diffraction by random surfaces: non-conforming sparse tensor boundary elements.
3. 11:30–11:50: **Laura Scarabosio**.
   Multilevel Monte Carlo for transmission problems with geometric uncertainties
4. 11:50–12:10: **Lukas Herrmann**, C. Schwab.
   MLQMC with product weights for elliptic PDEs with lognormal coefficients parametrized in multiresolution representations.
5. 12:10–12:30: **Prashant Kumar**.
   A multigrid multilevel Monte Carlo method for transport in the Darcy-Stokes flow.

12:30–14:00: **Lunch break**

Friday, September 8: Oskar von Miller Forum
14:00–15:40
Chair: Tom Lahmer

1. 14:00–14:20: **Ionut Farcas**, J. Latz, E. Ullmann, T. Neckel.
   Multilevel sparse Leja approximations in Bayesian inversion.
2. 14:20–14:40: **Björn Sprungk**.
   A Metropolis-Hastings importance sampling estimator.
3. 14:40–15:00: **Jonas Latz**, I. Papaioannou, E. Ullmann.
   Multilevel sequential^2 Monte Carlo for inverse problems
4. 15:00–15:20: **Yous van Halder**, B. Sanderse.
   Multi-element Padé-Legendre-based adaptive surrogate models for highly nonlinear and discontinuous responses.
5. 15:20–15:40: P. Benner, **Yue Qiu**, M. Stoll.
   Low-rank methods in Bayesian inverse problems.

15:40–15:50: **Closing** (Iason Papaioannou)