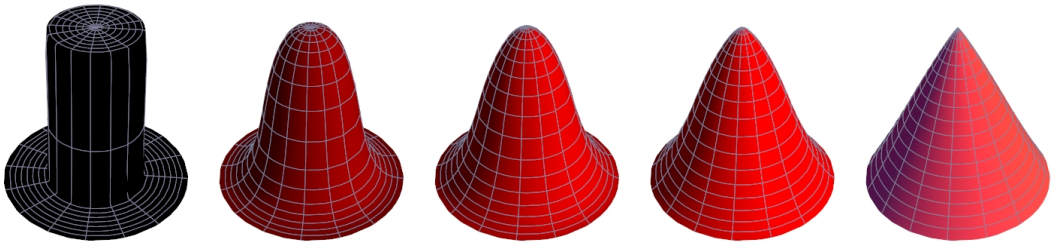


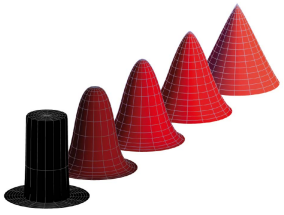
CoCoNoDE

The Cologne Conference on Nonlinear Differential Equations

Conference on the occasion of Bernd Kawohl's sixtieth birthday

February 25-28, 2013

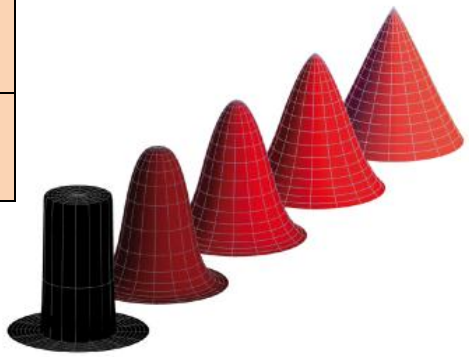
Organized by Barbara Wehmeyer, Dirk Horstmann, Guido Sweers



Contents

Schedule Cologne Conference on Nonlinear Differential Equations (CoCoNoDE 2013)

	Monday, 25-2-2013	Tuesday, 26-2-2013	Wednesday, 27-2-2013	Thursday, 28-2-2013
08:30 – 09:40	Registration			
09:00 – 09:50	09:45- 10:00 Welcome	Chair: S. Luckhaus **G. Talenti:** *Thoughts on a Busemann equation*	Chair: W. Jäger **M. Lucia:** *An optimal Onofri type inequality for the p-Laplacian*	Chair: C. Bandle **F. Schuricht:** *Eigenvalue problem for the 1-Laplace operator*
10:00 – 10:50	Chair: G. Sweers **W. Jäger:** *Interactions of the fluid and solid phases in complex media ...*	Chair: S. Luckhaus **P. Juutinen:** *Discontinuous gradient constraints and the infinity Laplacian*	Chair: W. Jäger **B. Dacorogna:** *The pullback equation for symplectic forms*	Chair: C. Bandle **W. Wendland:** *Nonlinear Riemann-Hilbert problems*
	Coffee break	Coffee break	Coffee break	Coffee break
11:20 – 12:10	Chair: C. Nitsch **A. Colesanti:** *Interactions between elliptic PDEs and convex geometry*	Chair: W. Reichel **H. Berestycki:** *The effect of a line with fast diffusion on Fisher-KPP propagation*	Chair: V. Ferone **G. Buttazzo:** *Some new problems in spectral optimization*	Chair: M. Feistauer **N. Kutev:** *Interior blow ups and 'interior boundaries' for second order elliptic equations*
	Lunch break	Lunch break	Lunch break	Lunch break
14:00 – 14:50	Chair: W. Wendland **C. Bandle:** *Shape derivatives and applications*	Chair: H. Berestycki **C. Dafermos:** *BV solutions for hyperbolic systems of balance laws with relaxation*	Chair: G. Buttazzo **M. Böhm:** *On some balance equations in the theory of material behaviour of steel*	Chair: A. Greco **C. Nitsch:** *On the best constant in a Sobolev trace inequality*
15:00 – 15:50	Chair: W. Wendland **M. Feistauer:** *Discontinuous Galerkin method for the solution of the interaction ...*	Chair: H. Berestycki **M. Fila:** *Extinction of solutions of the fast diffusion equation*	Chair: G. Buttazzo **W. Reichel:** *Distributional solutions of the stationary nonlinear Schrödinger equation ...*	Chair: A. Greco **S. Luckhaus:** *Deformation of Bravais lattices and plasticity*
	Coffee break	Conference photo	Coffee break	
16:20 – 17:10	Chair: S. Krömer **V. Ferone:** *On the minimizers of trace inequalities in BV*		Chair: B. Dacorogna **M. Novaga:** *Cheeger sets and isoperimetric towers*	
17:20 – 18:10	Chair: S. Krömer **P. Salani:** *Optimal concavity for p-capacity*	17.00 Social Program	Chair: B. Dacorogna **E. Parini:** *Optimal constants for higher-order functional embeddings*	
19:00 –		Conference dinner in: Gilden im ZIMS Heumarkt 77, 50677 Köln 19:00 h		



All lectures will take place in the `Seminargebäude': ground floor on the right.

► Registration and other technicalities

▷ Registration

On Monday morning from 8.30 am till 9.45 am the registration will be open in the room next to the lecture room in the 'Seminargebäude', Albertus-Magnus-Platz. For the location see the map on page 18. When you enter the building, the room is directly on your right hand side. The 'Seminargebäude'is is a new building and one of the few Cologne University buildings, which is presently not under renovation.

At the registration you will receive some information concerning the social program on Tuesday afternoon and evening. You will also be asked to classify yourself as non-acrophobic or non-claustrophobic. Please have your answer ready.

▷ Equipment

The lecture room in the 'Seminargebäude' that we will use, is called *Tagungsraum*. It contains a whiteboard-blackboard combination as well as a beamer that uses a screen in front of the blackboard-whiteboard. To use the beamer, one may connect with one's own notebook but, when you prefer to travel light, just a memory stick with your pdf-file will do. One of our notebooks will be present.

▷ Internet

The Math. Institute is being renovated, which means that access is rather restricted. We are trying to organize access via WLAN to the internet in the 'Seminargebäude'. If you want to use this, you will need to bring your notebook.

The information on these pages is also online. You may navigate to the conference's website `http://www.mi.uni-koeln.de/CoCoNoDE/` and use the link under **Program**.

Lectures in chronological order

The lectures will take place in the 'Seminargebäude', Albertus-Magnus-Platz. For the location see the map on page 18.

► Monday 25-2

Lecture by: Willy Jäger

Title: Interactions of the fluid and solid phases in complex media – coupling reactive flows, transport and mechanics

Abstract: Modelling reactive flows, diffusion, transport and mechanical interactions in media consisting of multiple phases, e.g. of a fluid and a solid phase in a porous medium, is giving rise to many open problems for multi-scale analysis and simulation. In this lecture, the following processes are studied:

- diffusion, transport, and reaction of substances in the fluid and the solid phase,
- mechanical interactions of the fluid and solid phase,
- change of the mechanical properties of the solid phase by chemical reactions,
- volume changes ("growth") of the solid phase.

In case of processes in tissues, a homogenization limit leads to an effective, mechanical system, containing a pressure gradient, which satisfies a generalized, time-dependent Darcy law, a Biot-law, where the chemical substances satisfy diffusion-transport-reaction equations and are influencing the mechanical parameters.

A Biot-law is used for describing the mechanical behavior of a ligament, a tissue connecting teeth with bone. A free boundary problem, modelling the movement of a tooth in the alveolar bone under external forces, will be discussed.

The interaction of the fluid and the material transported in a vessel with its flexible wall, incorporating material and changing its structure and mechanical behavior, is a process important e.g. in the vascular system (plague-formation) or in porous media.

The lecture is based on recent results obtained in cooperation with A. Mikelic, M. Neuss-Radu, M. Kihn and Y. Yang.

Lecture by: Andrea Colesanti

Title: Interactions between elliptic PDE's and convex geometry.

Abstract: In this talk I will try to describe the interplay between classical inequalities in Convex Geometry and qualitative properties of solutions of boundary value problems for elliptic equations. In particular I will focus on Brunn-Minkowski type

inequalities for the electrostatic capacity and convexity of level sets for the capacitary function of a convex set.

Lecture by: Catherine Bandle

Title: Shape derivatives and applications

Abstract: In this talk I would like to report on a common study with Alfred Wagner on the first and second domain variations for functionals related to elliptic boundary and eigenvalue problems with Robin boundary conditions. Of special interest will be domain deformations which preserve the volume. Minimality properties of the ball among nearly circular domains of given volume are derived, in particular a local version of the Bossel-Daners inequality for the first eigenvalue of the Laplacian with Robin boundary conditions. The discussion leads to the investigation of the eigenvalues of a Steklov eigenvalue problem. As a byproduct a general characterization of the optimal shapes is obtained.

At the end I shall comment on the difference between our approach with the one of Garabedian and Schiffer.

Lecture by: Miloslav Feistauer

Title: Discontinuous Galerkin method for the solution of the interaction of compressible flow and elastic structures

Abstract: One of subjects which plays an important role in science and technology is the mathematical simulation of fluid-structure interaction. It has applications in a number of areas as, for example, aerospace engineering (analysis of wing vibrations), mechanical engineering (analysis of vibrations of blades in turbomachines or vibrations of parts of cars), civil engineering (vibrations of various constructions as bridges, TV towers and cooling towers under the influence of a strong wind), but also medicine (simulation of blood flow in veins and heart or flow of air in vocal folds). Problems of fluid-structure interaction are rather complex, which causes that there is a lack of mathematical theoretical results. Particularly, in the case of compressible flow, not only mathematical theory is missing, but also the situation in numerical analysis is not satisfactory. It is caused by several obstacles, which have to be overcome: the dependence of the domain occupied by the fluid on time, shock waves and contact discontinuities in high-speed flows, acoustic effects and instabilities in low Mach number flows at incompressible limit, boundary layers and wakes for high Reynolds numbers and spurious oscillations in numerical solutions in the vicinity of discontinuities and large gradients (i.e., in internal and boundary layers).

The lecture will be concerned with the simulation of viscous compressible flow in time dependent domains with applications to the interaction of compressible

flow and elastic structures. The motion of the boundary of the domain occupied by the fluid is taken into account with the aid of the ALE (Arbitrary Lagrangian-Eulerian) formulation of the compressible Navier-Stokes equations.

This system is discretized by the discontinuous Galerkin finite element method (DGFEM) using piecewise polynomial discontinuous approximations. The time discretization is based on a semi-implicit linearized backward difference formula (BDF) or the space-time discontinuous Galerkin method. It is necessary to include a suitable local artificial viscosity in order to avoid spurious oscillations in the vicinity of internal and boundary layers. It appears that the developed method is accurate, efficient and robust with respect to the magnitude of the Mach number and the Reynolds number and allows the solution of complicated practical problems.

The compressible Navier-Stokes equations are coupled with equations describing the behaviour of elastic structures under the action of a moving gas. We consider two cases.

a) The interaction of a gas with an elastically supported airfoil with two degrees of freedom. The motion of an airfoil is described by a system of two second-order ordinary differential equations for the vertical displacement and the rotation angle of the airfoil.

b) Compressible flow in a channel with elastic walls described by the dynamical elasticity equations. This model is used for the simulation of airflow in human vocal folds. In both cases the interaction between the fluid and structure is realized via the relations defining the force acting on the structure by the flowing fluid, which leads to a strongly nonlinear dynamical system.

J. Česenek, M. Feistauer, A Kosík: DGFEM for the analysis of airfoil vibrations induced by compressible flow. ZAMM (to appear).

J. Hasnedlová, M. Feistauer, J. Horáček, A. Kosík, V. Kučera: Numerical simulation of fluid-structure interaction of compressible flow and elastic structure. Computing, published online, DOI 10.1007/s00607-012-0240-x .

Lecture by: Vincenzo Ferone

Title: On the minimizers of traces inequalities in BV

Abstract: It is well known that, for any given bounded domain $\Omega \subset \mathbb{R}^n$ with a "nice" boundary, $BV(\Omega)$ embeds in $L^1(\partial\Omega)$, in the sense that there exist two constants C and K depending on Ω such that

$$\|u - \text{med}_{\partial\Omega} u\|_{L^1(\partial\Omega)} \leq C\|Du\|(\Omega),$$

and

$$\|u - u_{\partial\Omega}\|_{L^1(\partial\Omega)} \leq K\|Du\|(\Omega),$$

for all $u \in BV(\Omega)$. Here $\text{med}_{\partial\Omega} u$ and $u_{\partial\Omega}$ are respectively the median and the mean value of the trace of u over the boundary of Ω. We prove that balls achieve

the least embedding constants in both inequalities. Uniqueness of such minimizers is also discussed in details. Some of the tools used in the proof are: modified Cauchy area formula, characterization of sets of constant brightness, characterization of sets of constant projection.

Lecture by: Paolo Salani

Title: Optimal concavity for p-capacity

Abstract: Let $p \in (1, n)$; if Ω is a convex domain in $\mathbb{R}^n$ whose p-capacitary potential function u is $(1-p)/(n-p)$-concave (i.e. $u^{(1-p)/(n-p)}$ is convex), then Ω is a ball. This result can be suitably inserted in the framework of overdetermined problems: here the overdetermination consists in a special geometric property of the solution which is finally proved to characterize balls.

► Tuesday 26-2

Lecture by: Giorgio Talenti

Title: Thoughts on a Busemann equation

Abstract: The following equation

$$\left(u_y^2 - 1\right) u_{xx} - 2u_x u_y u_{xy} + \left(u_x^2 - 1\right) u_{yy} = 0$$

can be viewed as a caricature of one that A. Busemann designed in investigating irrotational conical flows of compressible fluids. The same equation governs non-parametric maximal surfaces in the three-dimensional Minkowski space, as well as stream functions attached to two-dimensional flows of a Chaplygin gas. It is also cognate to Lavrentiev-Bitsadze equation, and shows up in certain generalizations of geometrical optics where complex-valued eikonals are involved. In the present lecture we comment on such topics.

Lecture by: Petri Juutinen

Title: Discontinuous gradient constraints and the infinity Laplacian

Abstract: Motivated by tug-of-war games and asymptotic analysis of certain p-Laplace problems, I will discuss the following gradient constraint problem: given a bounded domain $\Omega \subset \mathbb{R}^n$, a continuous function $f\colon \partial\Omega \to \mathbb{R}$ and a non-empty subset $D \subset \Omega$, find a solution to

$$\begin{cases} \min\{\Delta_\infty u, |Du| - \chi_D\} = 0 & \text{in } \Omega \\ u = f & \text{on } \partial\Omega, \end{cases}$$

where Δ_∞ is the infinity Laplace operator. This problem has a solution that is unique if $\overline{D} = \overline{D^\circ}$. If this regularity condition on D fails, then solutions obtained from game theory and L^p-approximation need not coincide.

This is a joint work with Mikko Parviainen and Julio D. Rossi.

Lecture by: Henri Berestycki

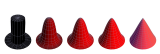
Title: The effect of a line with fast diffusion on Fisher-KPP propagation

Abstract: In this talk I will present a system of equations for the effect of a "road" with a fast diffusion on biological invasions. Outside of the road a classical Fisher-KPP (Kolmogorov-Petrovsky-Piskunov) propagation takes place. It is found that past a certain threshold for the ratio of diffusivities, the presence of the road enhances the global propagation. Several other effects such as transport or reaction on the "road" are discussed. I report on joint work with Jean-Michel Roquejoffre and Luca Rossi.

Lecture by: Constantine Dafermos

Title: BV solutions for hyperbolic systems of balance laws with relaxation

Abstract: For hyperbolic systems of balance laws with source manifesting relaxation, it is shown that the Kawashima condition, which yields global classical solutions with smooth initial values near equilibrium, is also instrumental in inducing the existence of global admissible BV solutions, accommodating shocks.



Lecture by: Marek Fila

Title: Extinction of solutions of the fast diffusion equation

Abstract: We consider nonnegative solutions of the Cauchy problem for the fast diffusion equation. Sufficient conditions for extinction in finite time are well known. We shall discuss results on the asymptotic behavior of solutions near the extinction time which were obtained in collaboration with John R. King, Juan Luis Vazquez, Michael Winkler and Eiji Yanagida.

► Wednesday 27-2

Lecture by: Marcello Lucia

Title: An optimal Onofri type inequality for the p-Laplacian

Abstract: In this talk, we will give several results that include some inequality derived by Carleson-Chang for a n-dimensional Moser-Trudinger type estimate. Our proof relies on a identity obtained for radial solutions of the equation $\Delta_n u = e^u$. This is a joint work with B. Kawohl.

Lecture by: Bernard Dacorogna

Title: The pullback equation for symplectic forms

Abstract: An important question in geometry and analysis is to know when two symplectic forms f and g are equivalent. The problem is therefore to find a map φ such that

$$\varphi^* (g) = f.$$

This means that if f and g are two closed $2-$forms with the same rank and are given by

$$f = \sum_{1 \leq i < j \leq n} f_{ij}(x)\, dx^i \wedge dx^j \quad \text{and} \quad g = \sum_{1 \leq i < j \leq n} g_{ij}(x)\, dx^i \wedge dx^j$$

then φ should satisfy the system of $n(n-1)/2$ first order partial differential equations given by

$$\sum_{1 \leq p < q \leq n} g_{pq}(\varphi(x))\, d\varphi^p \wedge d\varphi^q = \sum_{1 \leq i < j \leq n} f_{ij}(x)\, dx^i \wedge dx^j.$$

We will discuss local and global existence. We will also consider the case where we impose that the map φ is the gradient of a function Φ.

The results have been obtained in collaboration with S. Bandyopadhyay, G. Csato and O. Kneuss and can be found, in part, in the book below.

Csato G., Dacorogna B. et Kneuss O., *The pullback equation for differential forms*, Birkhäuser, PNLDE Series, New York, **83** (2012).

Lecture by: Giuseppe Buttazzo

Title: Some new problems in spectral optimization

Abstract: We present some new problems in spectral optimization. The first one consists in determining the best domain for the Dirichlet energy (or for the first eigenvalue) of the metric Laplacian, and we consider in particular Riemannian or Finsler manifolds, Carnot-Carathéodory spaces, Gaussian spaces. The second one deals with the optimal shape of a graph when the minimization cost is of spectral type. The third one is the optimization problem for a Schrödinger potential in suitable classes.

Lecture by: Michael Böhm

Title: On some balance equations in the theory of material behaviour of steel

Abstract: Cooling of hot steel leads to phase transformations inducing plastic deformations ("TRIP"). We present a model coupling small elastic and TRIP deformations as well as classical plasticity, phase changes and energy. We show well posedness of a corresponding initial-boundary value problem.

Lecture by: Wolfgang Reichel

Title: Distributional solutions of the stationary nonlinear Schrödinger equation: singularities, regularity and decay

Abstract: We consider the nonlinear Schrödinger equation

$$-\Delta u + V(x)\, u = \Gamma(x)\, |u|^{p-1}\, u \text{ in } \mathbb{R}^n.$$

Depending on the size of p we can exhibit two cases: in the first case, where p is smaller than a critical exponent, all distributional solutions are bounded strong solutions. In the second case, where p is larger than but close to a critical exponent, we prove the existence of distributional solutions with a point singularity at the origin and with exponential decay at infinity. The approach is generalized to non-variational systems of nonlinear Schrödinger equations. This is joint work with Rainer Mandel (KIT).

Lecture by: Matteo Novaga

Title: Cheeger sets and isoperimetric towers

Abstract: I shall consider a variational problem in a planar convex domain, motivated by statistical mechanics of crystal growth in a saturated solution. The minimizers are constructed explicitly and are completely characterized.

Lecture by: Enea Parini

Title: Optimal constants for higher-order functional embeddings

Abstract: We consider the problem of finding the optimal constant for the embedding of the space

$$W^{2,1}_{\Delta}(\Omega) := \left\{ u \in W^{1,1}_0(\Omega) \,|\, \Delta u \in L^1(\Omega) \right\},$$

endowed with the norm $\|u\| := \|\Delta u\|_1$, into the space $L^1(\Omega)$, where $\Omega \subset \mathbb{R}^n$ is a bounded, convex domain, or a bounded domain with boundary of class $C^{1,\alpha}$. This is equivalent to find the first eigenvalue of the 1-biharmonic operator under (generalized) Navier boundary conditions. In this talk we provide an interpretation for the eigenvalue problem, we show some properties of the first eigenfunction, and we enlighten the connection between the first eigenfunction and the torsion function, obtaining as a consequence an inequality of Faber-Krahn type. We will also state some results about the embedding into $L^1(\Omega)$ of the subspace $W^{2,1}_{\Delta,0}(\Omega)$, obtained as the closure in $W^{2,1}_{\Delta}(\Omega)$ of the set of smooth functions with compact support.

► Thursday 28-2

Lecture by: Friedemann Schuricht

Title: Eigenvalue problem for the 1-Laplace operator

Abstract: Taking the limit $p \to 1$ in the eigenvalue problem of the p-Laplace operator we are lead to the highly degenerate eigenvalue problem for the 1-Laplace operator. The talk provides a survey about main results and discusses new phenomena observed in that problem.

Lecture by: Wolfgang L. Wendland

Title: Nonlinear Riemann-Hilbert problems

Abstract: As a special case of nonlinear Rieman-Hilbert problems with closed boundary data in multiply connected domains, here a doubly connected domain like an annulus is considered.

The nonlinear boundary conditions for the desired holomorphic solutions lead to nonlinear singular integral equations on the boundary which belong to the class of quasiruled Fredholm maps defined on quasicylindrical domains in appropriate separable Banach spaces.

The closed boundary data give a priori estimates for the modulus of solutions which in turn implies a priori estimates in the Sobolev spaces considered here. For this class of problems, the Shnirelman-Efendiev degree of mappings can be defined which allows to investigate the existence of solutions if the boundary conditions satisfy some topological assumptions.

The lifting of the boundary value problem via holomorphic transformation onto the universal covering of the unit disc allows to construct a homotopic deformation of the lifted nonlinear singular integral equations to a uniquely solvable case which implies that the degree of mapping is 1 and existence of (in fact at least two) solutions follows.

If the nonlinear integral equations on the boundary are appoximated by trigonometric point collocation then the theory also implies that approximate solutions exist and converge asymptotically.

Lecture by: Nikolai Kutev

Title: Interior blow ups and 'interior boundaries' for second order elliptic equations

Abstract: Sharp conditions for interior gradient estimates of continuous viscosity solutions to fully, nonlinear elliptic equations under Dirichlet boundary conditions are investigated. When these conditions are violated, there can be blow up of the gradient of the viscosity solution in the interior of the domain. As a consequence, Perron solutions in general become discontinuous and the Dirichlet problem is unsolvable in the class of continuous viscosity solutions. The reason for this phenomenon is the "degeneracy" of the equation on the surface of the interior gradient blow up.

To overcome the difficulties with the notion of discontinuous viscosity solutions on the surface of the interior gradient blow up of the solution we suggest the splitting of the boundary value problem in two independent boundary value problems. In this case additional boundary conditions are not required on the artificially introduced "interior" boundary.

This theory is illustrated for linear second order elliptic equations, degenerating on a closed interior surface $S \subset \Omega$. The domain Ω is divided in two subdo-

mains, Ω_1, Ω_2, $\Omega_1 \cup S \cup \Omega_2 = \Omega$, $S = \partial\Omega_1$ and the boundary value problems for the equation in Ω_1 and Ω_2 are solved independently, without extra boundary condition on the "interior" boundary S. The composition of the viscosity solutions $u_1 \in C(\overline{\Omega}_1)$ and $u_2 \in C(\overline{\Omega}_2)$, i.e. $u = u_1$ in $\overline{\Omega}_1$, $u = u_2$ in Ω_2, $u \in C(\overline{\Omega})$, is the unique continuous viscosity solution of the Dirichlet problem in Ω.

Lecture by: Carlo Nitsch

Title: On the best constant in a Sobolev trace inequality

Abstract: It is well known that, for any given smooth bounded domain $\Omega \subset \mathbb{R}^n$, $H^1(\Omega)$ embeds in $L^2(\partial\Omega)$, namely there exists a constant C depending on Ω such that

$$\int_\Omega |Du|^2 + \int_\Omega u^2 \geq C \int_{\partial\Omega} u^2$$

for all $u \in H^1(\Omega)$. A long standing conjecture says that, among sets of given measure the ball achieves the optimal (worst) embedding constant. By relating this problem to a weighted isoperimetric inequality, we are able to prove that the conjecture is true at least in the class of nearly spherical sets.

Lecture by: S. Luckhaus

Title: Deformation of Bravais lattices and plasticity

Abstract: We are trying to give a description of solid phase metals on multiple scales. The smallest scale description is that of deformed (Bravais) lattices. In a previous paper with L. Mugnai we gave a Hamiltonian that is locally identifying Bravais lattices and elastic strain for many particle configurations. Here we associate continuum energies with these Hamiltonians (work in progress with J. Wohlgemuth). The appropriate formulation for this microscale continuum state seems to be in terms of currents in the sense of geometric measure theory.

► Lunch and dinner

Except for Tuesday evening no common meals are organized. Down below you will find some places for lunch or dinner near the university. They range from very simple to not so simple. See also the map on one of the next pages.

On Campus:

- Main Mensa
- Mensa Robert-Koch Straße

Direction Northwest:

- Il Belluno, Hans-Sachs-Straße 4, 0221 99876900, `http://www.il-belluno.de`
- NIKKO, Dürener Straße 89, 0221 400-0094, `http://www.nikko-koeln.de`
- Haus Moritz, Dürener Straße 143, 0221 409364
- Al Gufo, Dürener Straße 157, 0221 409651, `http://www.algufo.de`
- Kölsche Bodega, Dürener Straße 180, 0221 4000611, `http://www.koelsche-bodega.de`
- Culinarius, Dürener Straße 193-197, 0221 4061348, `http://www.culinarius-koeln.de`
- Haus Schwan, Dürener Straße 235, 0221 403368, `http://www.haus-schwan.de`

Direction South

- Café Krümel, Zülpicher Straße 207, 0221 426767
- Cantina Mexicana Laspediras, Weyertal 38, 0221 428007
- Da Siro, Weyertal 41, 0221 441051, `http://www.dasiro.de`

Direction city-center

- Restaurant L'escalier, Brüsseler Straße 11, 0221 2053998, `http://www.lescalier-restaurant.de`
- El-Inca Restaurant, Görresstraße 2, 0221 245503, `http://www.el-inca.de`

- Weinstube Bacchus, Rathenauplatz 17, 0221 217986,
  http://www.weinstubebacchus.de
- Fischermanns, Rathenauplatz 21, 0221 801-7790,
  http://www.restaurant-fischermanns.de
- Hellers Brauhaus, Roonstraße 33, 0221 2401881,
  http://www.hellers-brauhaus.de
- Ristorante Etrusca, Zülpicher Straße 27, 0221 2403900,
  http://www.ristorante-etrusca.de
- Café Barista Kaffeekunst, Kyffhäuserstraße 50, 0221 27162031,
  https://www.facebook.com/cafebaristakaffeekunst

City-center: Brauhauses offer usually good value for money concerning food

- Gaffel am Dom, Bahnhofsvorplatz 1, 0221 9139260,
  http://www.gaffelamdom.de
- Früh am Dom, Am Hof 12-18, 0221 2613211,
  http://www.frueh.de
- Gilden im Zims, Heumarkt 77, 0221 16866110,
  http://gilden-im-zims.de

▷ Local food

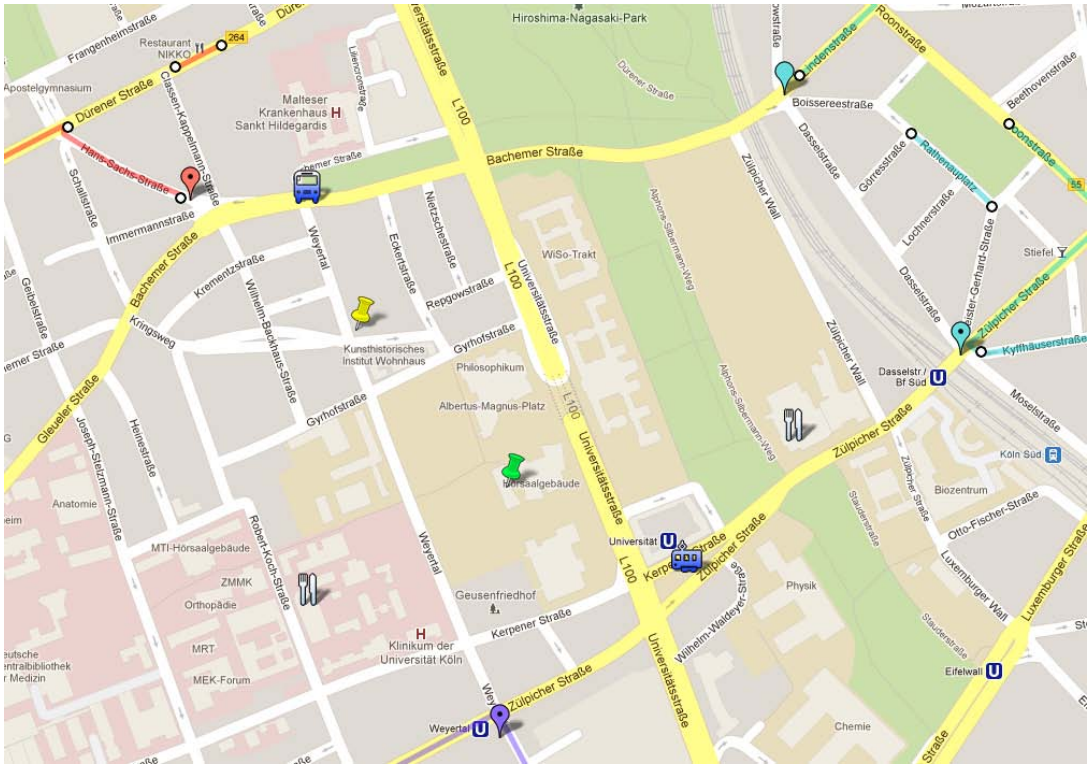
Mett auf einem Röggelchen (raw ground pork on a rye roll) – Kölsche Kaviar (blood sausage) – Halver Hahn (cheese on a bread roll) – met Musik (onions added) – Ehrengarde der Stadt Köln (fried egg with spinach) – Himmel un Ääd (fried blood sausage, apple sauce and mashed potatoes) – Hämmchen (boiled knuckle of pork) – Matjes (salted fresh herring) – Grillhaxe (grilled knuckle of pork) – Pommes Rut-Wiess (french fries, ketchup and mayonnaise)

▷ Local beverage

To have it fresh, Kölsch is served in small glasses called Stange. To keep the customer satisfied empty glasses are quickly replaced by full ones. To stop the waiter, den Köbes, from changing glasses, just put the beer coaster on top.

For a list of breweries see:
http://www.koeln-altstadt.de/koelsch/koelschtrinken/koelschsorten/index.html

► Interactive Map



The interactive version of this map can be found on `http://goo.gl/maps/ixnTw` .

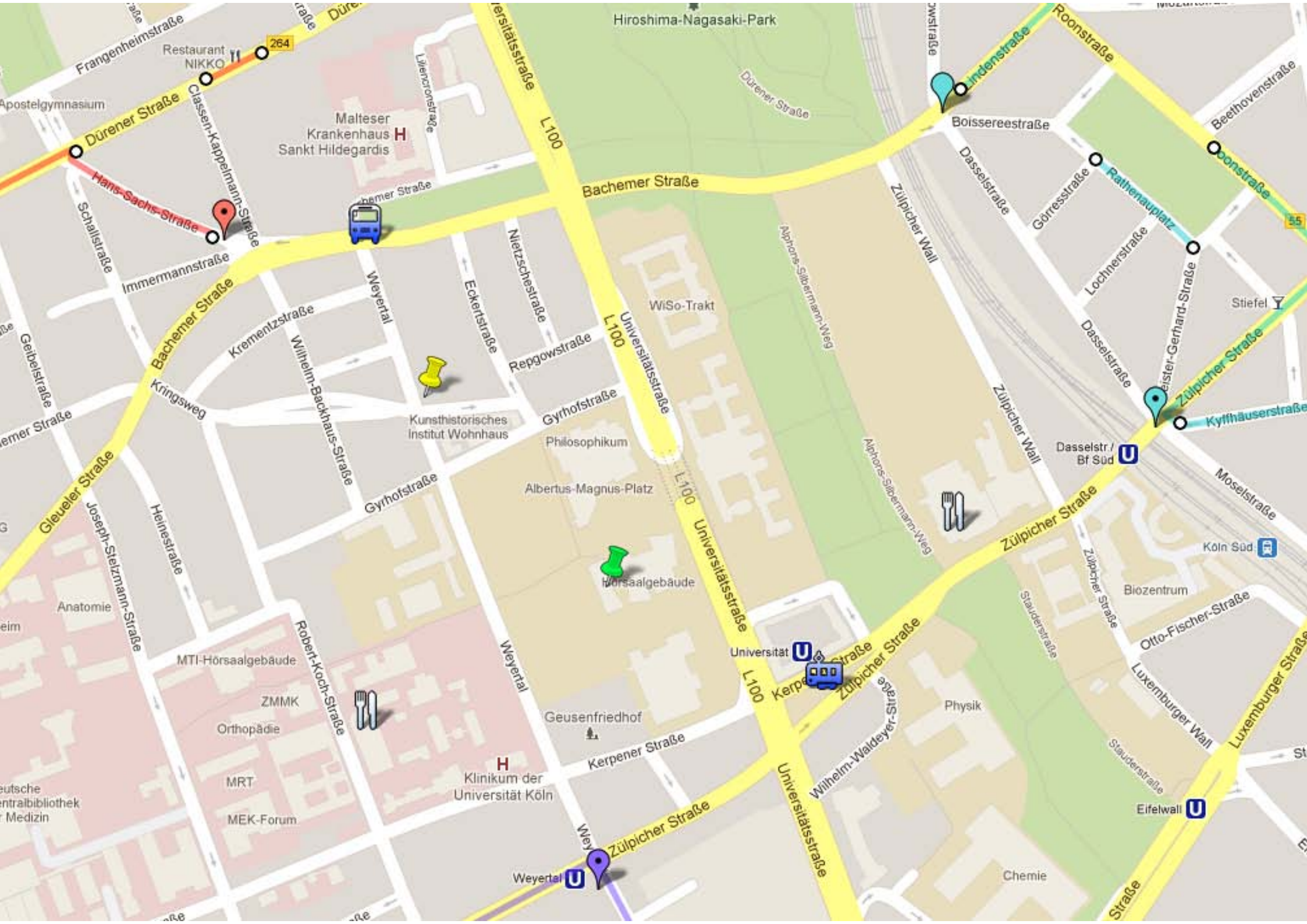
- **Seminargebaeude**
  Lectures CoCoNoDE 2013
- **MI**
  The Mathematical Institute is under renovation. The offices of Kawohl and Sweers can still be reached through a back entrance.
- **Hotel**
  Hotel Flandrischer Hof Flandrische Straße 3-11 50674 Köln 0221 2036 ext. 0
- **Mensa I**
  the main mensa
- **Mensa II**
  Mensa Robert Koch Strasse
- **To Duerenerstrasse**
  Restaurants direction Northwest
- **Weyertal South**
  There are several restaurants going south on Weyertal.
- **To city-center**
  Through Zuelpicher and Bachemer Strasse one may go to the city-center. After passing under the railway one finds many restaurants.
- **To city-center**
  The shortest way from Hotel Flandrischer Hof to the conference crosses here.

▷ Local transportation

- Buses 136 and 146 stop where Bachemer Straße meets Weyertal and pass close to Hotel Flandrischer Hof. The distance is a so-called ‘Kurzstrecke’, which costs €1.90.
- Taking the subway/tramway one should make a change at ‘Zülpicher Platz’ and head for ‘Universität’ with Line 9.
- Tickets from the university to the city-center cost €2.70. Tickets are valid on buses and subway/tramway. Vending machines for the tickets can be found inside buses and trams.

► Participants

Catherine Bandle (Basel)
Josef Bemelmans (Aachen)
Henri Berestycki (Paris)
Michael Böhm (Bremen)
Friedemann Brock (Leipzig)
Giuseppe Buttazzo (Pisa)
Andrea Colesanti (Firenze)
Bernard Dacorogna (Lausanne)
Constantine Dafermos (Providence)
Matthias Erven (Hannover)
Miloslav Feistauer (Praha)
Vincenzo Ferone (Napoli)
Marek Fila (Bratislava)
Antonio Greco (Cagliari)
Steffen Heinze (Heidelberg)
Jiri Horak (Stuttgart)
Dirk Horstmann (Köln)
Veronica Istrate (Köln)
Willi Jäger (Heidelberg)
Petri Juutinen (Jyväskylä)
Agnieszka Kalamajska (Warszawa)
Bernd Kawohl (Köln)
Laura Keller (Münster)
Jan Krämer (Köln)
Stefan Krömer (Köln)
Florian Krügel (Köln)
Markus Kunze (Köln)
Nikolai Kutev (Sofia)
Samuel Littig (Dresden)
Stephan Luckhaus (Leipzig)
Marcello Lucia (New York)
George Marinescu (Köln)
Carlo Nitsch (Napoli)
Matteo Novaga (Padova)
Enea Parini (Marseille)
Wolfgang Reichel (Karlsruhe)
Paolo Salani (Firenze)
Friedemann Schuricht (Dresden)
Angela Stevens (Münster)
Guido Sweers (Köln)
Giorgio Talenti (Firenze)
Alfred Wagner (Aachen)
Wolfgang Wendland (Stuttgart)


Hiroshima-Nagasaki-Park
Frangenheimstraße
Restaurant NIKKO
264
Dürener Straße
Classen-Kappelmann-Straße
Apostelgymnasium
Malteser Krankenhaus Sankt Hildegardis
H
Lilienthalstraße
Hans-Sachs-Straße
Schallstraße
Immermannstraße
Bachemer Straße
Nietzschestraße
Eckertstraße
Weyertal
Krementzstraße
Wilhelm-Backhaus-Straße
Kringsweg
Gyrhofstraße
Repgowstraße
Kunsthistorisches Institut Wohnhaus
Philosophikum
Albertus-Magnus-Platz
Hörsaalgebäude
WiSo-Trakt
L100
Universitätsstraße
Alphons-Silbermann-Weg
Gleueler Straße
Geibelstraße
Joseph-Stelzmann-Straße
Heinestraße
Robert-Koch-Straße
Anatomie
MTI-Hörsaalgebäude
ZMMK
Orthopädie
MRT
MEK-Forum
Klinikum der Universität Köln
Geusenfriedhof
Kerpener Straße
Universität
Zülpicher Straße
Wilhelm-Waldeyer-Straße
Physik
Chemie
Weyertal
Lindenstraße
Boissereestraße
Roonstraße
Beethovenstraße
Dasselstraße
Görresstraße
Rathenauplatz
Lochnerstraße
Zülpicher Wall
Meister-Gerhard-Straße
Stiefel
Kyffhäuserstraße
Dasselstr./ Bf Süd
Moselstraße
Köln Süd
Biozentrum
Otto-Fischer-Straße
Luxemburger Straße
Luxemburger Wall
Stauderstraße
Eifelwall