

Gruppe Computermathematik (CMA)

Fakultät für Mathematik

2.11.2007

Members

- Prof. Arnold Neumaier,
- Prof. Hermann Schichl, vis. Prof. Oleg Shcherbina,
- Dr. Waltraud Huyer (on leave), Dr. Mihaly Markot,
- 5-6 PhD students,
- 7-10 Master students,

Lecture courses

- Introduction to Mathematical Reasoning,
- Numerical Mathematics and Modeling 1-2,
- Optimization and Variational Calculus,
- Technical Practice of Computer Systems,
- Computer Practice for Future Teachers,
- Mathematical Methods of Data Analysis,
- Artificial Intelligence,
- Interval Analysis,
- Numerical Linear Algebra,
- Mathematical Methods for CAD,
- Classification and Pattern Recognition,
- Real Algebraic Geometry and Polynomial Optimization

In addition, various seminars and project seminars on optimization, modeling, numerical analysis, computational statistics, data analysis, quantum physics

Publications

Since 2003: 36 publications and approx. 15 technical reports in the areas

- Optimization (global optimization, gradient-free and noisy optimization, constraint satisfaction, modeling),
- Numerical Analysis (interval methods, computer-assisted proofs, regularization methods),
- Computational Statistics (nonlinear parameter estimation, uncertainty modeling),
- Quantum Physics (resonances, quantum optics, foundations)

Web, Software, etc.

- Since 1996, the CMA group maintains a comprehensive archive of online information on global optimization, and somewhat less comprehensive on local optimization, numerical and statistical software.
- Software maintained by CMA:
 - REML, Restricted Maximum Likelihood Estimation (in Fortran 90)
 - ARFIT, Multivariate Autoregressive Time Series Analysis
 - MINQ, General Definite and Bound Constrained Indefinite Quadratic Programming
 - MCS, Global Optimization by Multilevel Coordinate Search
 - SNOBFIT, Stable Noisy Optimization by Branch and Fit
 - VGTL, Vienna Graph Template Library
 - COCONUT, Complete Constraint Satisfaction and Global Optimization
 - GloptLab, Rigorous Global Optimization

Completed projects since 2003

- FWF-Project: “Parameterised Reference Models for Hominoidal Skulls” (2001-2003, EUR 300.000, in cooperation with the Institute of Anthropology)
- EU project COCONUT, “Continuous Constraints: Updating the Technology” (2000-2004, EUR 400.000)
- ESI Invitation Program: “Global Optimization – Integrating Convexity, Optimization, Logic Programming and Computational Algebraic Geometry” (about 30 guests in October-December 2006)
- ARIADNA project (European Space Agency, ESA): “The Application of Clouds for Modelling Uncertainties in Robust Space System Design” (2006–2007, EUR 28.000)

Current projects

- FWF-Project: “Global Optimization Techniques in combinatorial Optimization” (2005–2008, Oleg Shcherbina, EUR 200.000)
- FWF-Project: “A Software Platform for Global Optimization” (2006-2009, Hermann Schichl, EUR 225.000)
- Research Platform Scientific Computing: “Advanced Modeling in Global Optimization” (Arnold Neumaier, 2006-2009, EUR 220.000)

Planned projects

- FWF-project, submitted: “A Modeling System for Mathematics” (Arnold Neumaier, EUR 280.000 requested)
- FWF-project, in preparation: “Symmetries in Global Optimization” (Hermann Schichl)

- Global optimization:
 - Floudas (Chemical Engineering, Princeton, USA),
 - Sahinidis (Chemical Engineering, Urbana-Champaign, USA),
 - Benhamou (Computer Science, Nantes, F),
 - Csendes (Computer Science, Szeged, HU),
 - Sam-Haroud (Computer Science, EPFL, Lausanne, CH)
- Applications in physics, chemistry and engineering:
 - Hartke (Chemistry, Kiel, D),
 - Lodwick (Denver, USA),
 - Mandelshtam (Chemistry, Irvine, USA),
 - Merlet (Robotics, INRIA, Sophia Antipolis, F),
 - Muhanna (Mechanical Engineering, Savannah, USA)
 - Pownuk (Computer Science, El Paso, USA)

in Austria

- EVN (prediction in electricity markets)
- ZKW (optimal light distribution of headlights of cars)

International

- ILOG (global optimization software)
- GAMS (modeling language interfaces)
- AMPL (modeling language interfaces)
- ESA (uncertainty modeling in robust spacecraft design),

Gruppe NuHAG
Numerical Harmonic Analysis Group

...

www.nuhag.eu

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The present situation (2006-2007)

NuHAG aims at representing harmonic analysis in its entire breadth, from the development of numerical algorithms for signal processing and image analysis to abstract problems on operator algebras (non-commutative tori) or representation theory of the Weyl-Heisenberg group.

Typical topics discussed within NuHAG projects:

- Time-Frequency analysis, time-variant systems, pseudodiff.-operators;
- Gabor Analysis, dual Gabor systems, Gabor multipliers;
- coorbit spaces, Banach frames, atomic decompositions;
- irregular sampling, reconstruction from averages; iterative algorithms;
- spline-type spaces, functions of variable band-width, etc.

Publications

Publications of NuHAG are publically visible at the NuHAG Web-page
There have been 36 (2003), 25 (2004), 43 (2005), 49 (2006) publications
(we expect a similar number for 2007).

Pure

ACHA, **JFAA**, J.Funct.Anal., Adv. Math.,
J.Amer.Math.Soc., Journ.d'Analyse Math.,
J.Math.Anal.Appl., J.Op.Th., Trans. AMS,
Math.Nachr., Rev. Math. Iberoam.,

Applied

ACHA
SIAM journals
IEEE journals
STSIP

Output in terms of courses, talks, software, workshops, PhDs,
habilitations, are found at WWW.NUHAG.EU, also for past years!

The NuHAG TEAM

Permanent Staff (2), one position dedicated

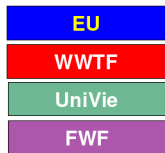
- Prof. K. Gröchenig (full prof. since 2006, EUCETIFA team leader)
- a.o. Prof. Hans G. Feichtinger

Internat. Team of 25+ coworkers (third party funded, 7 UniVie)

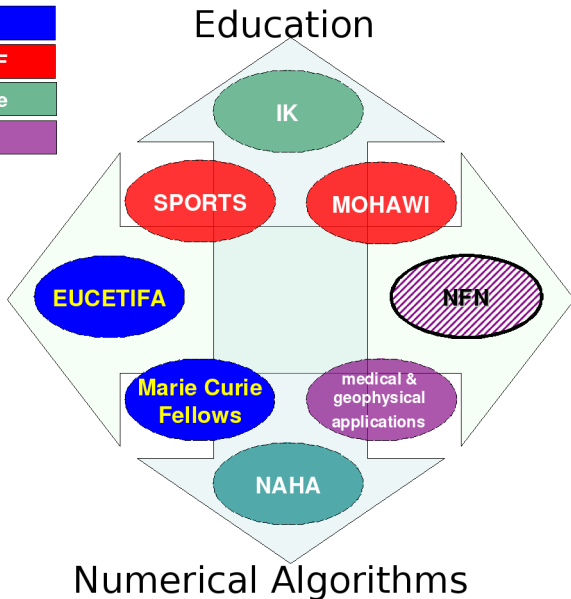
- 11 PostDocs (Marie Curie, EUCETIFA, WWTF,FWF,...)
- 10 PhD students (6 within IK);
- 4 Master students;
- typically 2-5 visitors;
- 5 administrative and IT employees (part time)

Current (total of 10 projects, approx. 4 Mill. Euro Budget)

- **EU:** EUCETIFA Marie Curie Excellence Grant (2005-2009);
- **EU:** 2 Indiv. Marie Curie fellows (Marelli, Rauhut): 2006-2008;
- **EU:** Massimo Fornasier (outgoing, to Princeton, now at RICAM);
- 2 **WWWTF** projects (with TU Vienna):
MOHAWI (2005-2008), and SPORTS (2008-2011, Rauhut);
- **FWF** Translational project: ECG-Analysis via TF (2005-2008);
- **FWF** project Symplectic Geometry: TF-analysis and QM (2008-2001);
- **UniVie:** IK Time-Frequency Analysis and Microlocal Analysis
(Initiativ-Kolleg: Feichtinger/Kunzinger), 2006-2009;
- **UniVie:** Computational Science Project NAHA (2006-2009);



TECHNOLOGY



reload

NuHAG

Project-Management

-back to NuHAG | START |

Budget-line

begin: end: zoom: planned:

- Berta Sutner fellowship
- EUCETIFA (FA506011)
- EUCETIFA (FA506011) Management
- EUCETIFA (FA506015)
- EUCETIFA-visitor
- Faculty Project Database
- Fornasier (FA506009)
- FWF (Amann)
- HASSIP (506001)
- HASSIP Admin
- IK-Fei (IKS06001)
- Marie-Curie fellow
- Möller FA506020
- MOHAWI
- NAHA (FS506001)
- NetAGES

*remove selection
*select all

	Berta Sutner fellowship	EUCETIFA (FA506011)	EUCETIFA (FA506011) Management	EUCETIFA (FA506015)	Faculty Project Database	Fornasier (FA506009)	FWF (Amann)	HASSIP (506001)	HASSIP Admin	IK-Fei (IKS06001)	Marie-Curie fellow	Möller (FA506020)	MOHAWI	NAHA (FS506001)	NetAGES	
01-06	Gr	Hr	Rz	Lu	Sc	Ma	Wi									321856 [321856]
02-06	Gr	Hr	Rz	Lu	Ma	Sc	Wi									341636 [663506]
03-06	Gr	Hr	Rz	Lu	Ma	Sc	Kr	Wi								429406 [1092396]
04-06	Gr	Hr	Rz	Lu	Ma	Sc	Kr	Wi								482676 [1525656]
05-06	Gr	Hr	Rz	Lu	Ma	Sc	Kr	Wi								499576 [1965626]
06-06	Gr	Hr	Rz	Lu	Ma	Sc	Kr	Wi								443026 [2940864]
07-06	Gr	Hr	Rz	Lu	Ma	Sc	Kr	Wi	Es	Sa	Ra					538014 [2946656]
08-06	Gr	Hr	Rz	Lu	Da	Ma	Sc	Kr	Wi	On	He	Wi	Ma	Es	Ba	580186 [3548506]
09-06	Gr	Hr	De	Rz	Lu	Je	Sc	Kr	Be	On	He	Wi	Ma	Es	Ba	602586 [4354086]
10-06	Gr	Hr	Da	Lu	Pl	Ne	Ma	Je	Sc	Kr	We	Ma	Ac	Br	Sp	672886 [5080956]
11-06	Gr	Hr	Da	Lu	Pl	Ne	Ma	Je	Sc	Kr	We	Ma	Ac	Br	Sp	708806 [5785756]
12-06	Gr	Hr	Da	Lu	Pl	Ne	Ma	Je	Sc	Kr	We	Ma	Ac	Br	Sp	748576 [6537826]
01-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	764556 [7222376]
02-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	695906 [7831676]
03-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	686136 [8517896]
04-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	696206 [9214126]
05-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	754226 [9968346]
06-07	Gr	Hr	Da	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	774814 [10743154]
07-07	Gr	Hr	Da	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	812496 [11555086]
08-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	760506 [12316086]
09-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	714196 [13092076]
10-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	689416 [13719886]
11-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	652146 [14965826]
12-07	Gr	Hr	Lu	Pl	Ne	Ba	Je	Sc	Kr	We	Ac	Br	Sp	Sa	Da	650526 [15016846]



NuHAG Strategic Goals (Feichtinger)

- continue to establish NuHAG as an international **center of gravity** within application oriented harmonic analysis;
- stabilize existing infra-structure (beyond 2009);
- offer high potentials an academic career (Fornasier, Rauhut, Luef, Dörfler, Kaiblinger, ...)
- maintain interdisciplinarity;
- network with excellent partners world-wide;
- strengthen the computational aspects of Harmonic Analysis;
- prepare books and software on the subject;
- organize workshops and conferences (Strobl 2008);

NuHAG SCIENTIFIC VISION (Gröchenig)

Develop further new mathematical results, concepts and ideas and demonstrate their relevance for applications. ^a

^aOur goal is application oriented fundamental research!

FOUNDATION

pseudo-differential operators
atomic decompositions
sparse approximations
Banach frames
localization theory
teaching material

APPLICATIONS

slowly varying channels
wireless communication
compressed sensing
efficient numerical algorithms
signal representations
MATLAB code

Recent Proposal Activities (2006/2007), > 12 submissions

- ① **EU** 2006: *Conference Series Harmonic Analysis (declined)*;
- ② *ESO (European Southern Observatory): declined by ministry*;
- ③ 2007: *ITN Network CHAMASIP (coordinated by HGFei) (Mathematics + Signal Processing, declined)*;
- ④ Individ. Marie Curie Fellowships i.e. 1:Luef (Outgoing), 2: Onchis, 3: Heineken (Intra Europ.), 4: Mahri (Incoming); decision: Dec. 2007
- ⑤ 2 **ERC-** *applications (Fornasier, Rauhut); (just not good enough)*
- ⑥ 2007: 2 **WWTF** proposals (Rauhut, and Balazs (ARI, OEAW));
- ⑦ **FWF**: Symplectic Geometry: TF-analysis and QM (2008-2011)
- ⑧ **NFN proposal** (National Research Network), presented Oct. 2007, decision Dec. 2007 (duration 3+3 years);
- ⑨ Monika Dörfler: Herta Firnberg fellowship application (Dec.2007)

NuHAG databases:

You can use following databases:

[on the motivation for our toolboxes, HGFeI]

[bibtex]	all NuHAG-Publications
[books]	Please submit here if you borrow a book from the NuHAG library
[conferences]	upcoming and past international conferences
[events]	program of NuHAG-events
[matlab-module]	MMODULE - the NuHAG-MatLab-Center NEW
	» The Linear Time-Frequency Analysis Toolbox «
[matlab-blocks]	Collection of MatLab-blocks
[media]	the NuHAG-Media-Center
[program]	programs of upcoming and past NuHAG-events
[refunding]	submit a refunding-request NEW
[talks]	all talks given at NuHAG-events
	edit/submit a new talk «
[task]	the NuHAG-Task-Manager
[TeX]	Tool for mathematical TeX-macros
[TeX-blocks]	Collection of TeX-blocks
[TeX-files]	Collection of TeX-files
[visitors]	visitor and room management

NuHAG-Tools:

[address2LaTeX]	converts an address to a LaTeX address-block
[citeCONTROL]	search for publications and citations
[contact]	The Contact/Application form of NuHAG
[contentMANAGEMENT]	the NuHAG up/download area NEW
[email]	email to all NuHAG-members and visitors
[ip]	IP address of your computer
[meeting]	tool for arranging a meeting NEW
[SAP-report]	SAP-report tool
[templates]	templates for personal homepages in NuHAG-design
[WIP]	[Work In Progress] DB for requests

NuHAG-Miscellaneous:

[NuHAG-SCHEDULER]	NuHAG-scheduler :: add TALKS, CONFERENCES, AVAILABILITY
[NuHAG-QUESTION]	Please answer this question...

address-search:



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NuHAG

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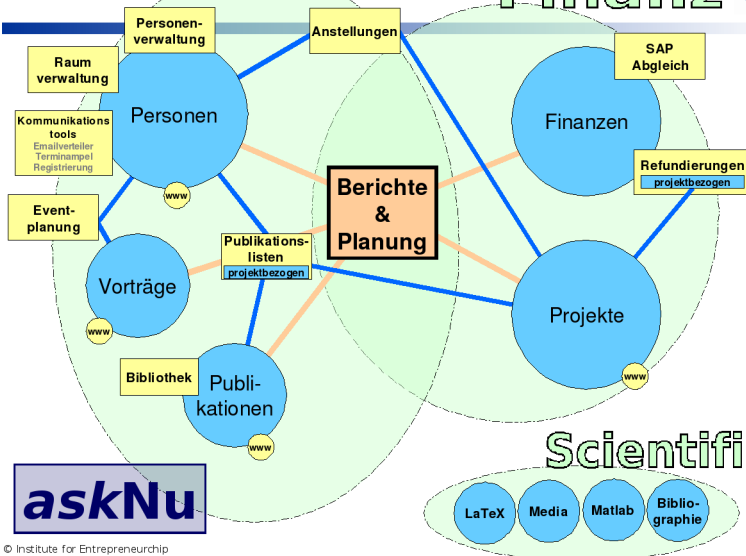
[how to get there](#)
[Contact/Application form](#)
[NuHAG-schedule](#)

login:



Personen

Finanz



Infrastructure Services by NuHAG

- NuHAG hosts the GABOR SERVER;
- NuHAG has just launched the **Austrian Mathematical Portal**;
- the bibliographic system of NuHAG (about 4500 entries) is also used by the faculty;
- access to NuHAG talks and events (ESI, Confs, etc.);
- NuHAG has its own library (with approx. 1000 books);
- NuHAG offers its MATLAB toolboxes, in particular since 2007 the “Linear Time-Frequency TB” put together by Peter Soendergard (Univ. Copenhagen);

NuHAG WISHES for the years to come:

- 1 Continued support by the University of Vienna (rector's team) and faculty, mostly to ensure office space (OK now) and a broader LONG-TERM equipment with staff, in order to stabilize international position;
- 2 Having the chance to enlarge the existing platform and infrastructure, e.g. within the university focus point "Computational Sciences" [especially after the end of EUCETIFA, 2009];
- 3 LAST but not least: official chance for a sabbatical semester (in order to go back to more research) for myself (HGFei).

As we see it there are plenty of chances for new projects which are not in any direct competition with other mathematical fields (cooperation in geophysics, medicine, astronomy etc.)

projektSERVICE

[home](#) | [open calls](#) | [projektSERVICE team](#) | [projektDATABASE](#) | [projektADMINISTRATION](#) | [documents](#) | [tools](#) |

TEAM:



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For appointment please use this scheduler



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For appointment please use this scheduler

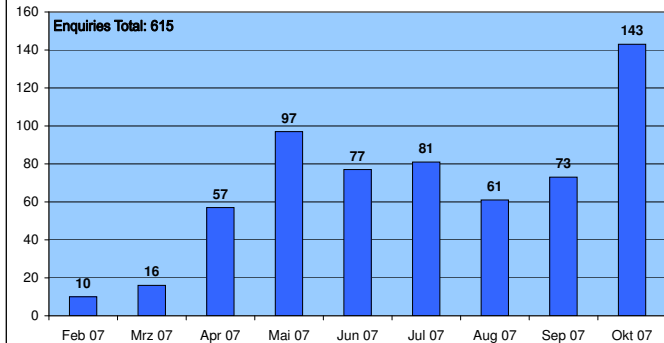


Activities of project service

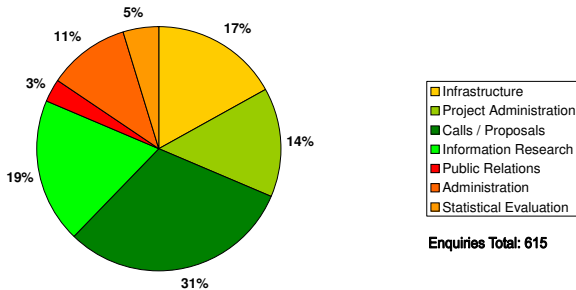
- inform about open calls, deadlines and conditionsg
- provide information to dean's office (PROJECT DATABASE)
- Research project-related information (e.g. proposals, contracts, financial management, employee administration)
- First contact for project employees
- Statistical evaluations
- maintain Website projektSERVICE
www.mat.univie.ac.at/projektservice
- Help with public relations



Enquiries per Month projektSERVICE 02/2007 - 10/2007



Distribution of Enquiries
projektSERVICE 02/2007 - 10/2007



Enquiries Total: 615