

A Proposal Requesting Partial Funding from MSRI for a Regional Mathematics Conference

The Midwest Geometry Conference (MGC), May 18–20, 2007 (Three Full Days!),
The University of Iowa.

We are seeking support from the MSRI in the amount of \$3,000 to help underwrite a geometry conference (MGC) at The University of Iowa in May of 2007. MGC is a series of annual conferences, and it is in all likelihood the largest such regularly organized meetings in the subject areas of geometry, geometric analysis and mathematical physics.

Even though traditionally, MGC has had a more regional flavor, for reasons outlined below, this MGC 07 in particular will now have a substantial international participation (attendance and speakers) from around the country, and indeed from around the globe; much more so than the earlier MGCs.

Speakers and topics

Our program will focus on seven interrelated areas, all connected to conformal geometry.

The invited main speakers who so far responded favorably are: Professors Ivan Avramidi (New Mexico), Alice Chang (Princeton University), Mike Eastwood (University of Adelaide), Rod Gover (University of Auckland), Peter Gilkey (University of Oregon), Robin Graham (University of Washington), Gestur Ólafsson (Louisiana State University), Bent Ørsted (University of Aarhus, Denmark), William Ugalde (Purdue University), Paul Yang (Princeton University).

Main topics include

- p-harmonic geometry
- geometric flows
- complex and Riemannian geometry
- conformal geometry: Q-curvature
- convex geometry, minimal varieties, symmetric criticality and algebraic geometry
- PDEs, geometric measure theory
- mathematical physics: e.g., functional determinants of conformal operators on 4-manifolds

Minimal summary details: In each of the last two years, late in May, there have been geometry conferences in the region. And now for May 2007 it will take place at The University of Iowa. The 2007 MGC is planned to be bigger than its precursors, and there are good reasons for why this is so (details below).

The official conference name is “The Midwest Geometry Conference (MGC 2007)”, and it will take place in The Department of Mathematics (with help from the Physics Department) of The University of Iowa, Iowa City.

Background: The planning of MGC 2007 had been started by Professor Tom Branson, but as I expect you know, Tom Branson died suddenly and tragically on March 11, 2006. A group of Tom Branson’s colleagues, former students and postdocs here at the University of Iowa is now working on making into reality this conference (MGC) that Tom envisioned to take place here in May 2007.

We can now announce that MGC 07 will go forward:

The 2007 Midwest Geometry Conference (MGC 07)

will take place at The University of Iowa, Iowa City, IA,
from Friday, May 18th, through Sunday, May 20th.

Aside from being a wonderful colleague, and a world class mathematician, over the years Tom has selflessly played a leading role in putting together conferences and workshops in geometry, geometric analysis and mathematical physics that have greatly enhanced and improved the infra structure in mathematics and its neighboring disciplines. The conferences and Tom’s inspiration have been vital for graduate students, postdocs, faculty and senior researchers alike.

The MGC is planned as a three-day conference with plenary speakers and parallel sessions for three *full* days, May 18–20, 2007, at The University of Iowa.

Budget

We anticipate ten plenary speakers, and an attendance of a little more than one hundred. To support them, we hope to raise at least \$25,000, and this will include the \$12K award we have from the NSF. We have NSF support (\$12K), and support from our college (\$4K). As it turned out, there is now a lot more interest in MGC-2007, and our plans have become more ambitious. I have reason to believe that Tom Branson was planning to request MSRI funding.

Close to 100% of the total will go into participant support. For refreshments and such, we expect to charge a modest registration fee. We hope to pay most of the local expenses for those participants who will not be able to pay with grants of their own, and to help pay travel for plenary speakers.

Organization

The local faculty organizers are Professors Oguz Durumeric, Palle Jorgensen, Walter Seaman (from math), and Vincent Rodgers (from the physics department.)

We have an external scientific committee consisting of Professors Mike Eastwood (University of Adelaide), Rod Gover (University of Auckland), Gestur Ólafsson (Louisiana State University), Lawrence Peterson (University of North Dakota).

In addition, a number of faculty and graduate students in both the mathematics and the physics departments at The University of Iowa expressed a strong interest in the conference.

The MGC conferences play a big role for the cross-fertilization in our field which has now turned into an interdisciplinary subject.

Furthermore, in March 2006 when Tom died, he was teaching a big graduate course (22M:324) leading into the topics of the conference. Several of us are helping this course to move forward.

MGC 2007 has strong local support, including from our Chair Professor David Manderscheid, Math, University of Iowa. In addition to the local organizers, many other colleagues on campus support MGC 07. The list includes Charles Frohman, Fred Goodman, Tuong Ton-That, Lihe Wang (in math); and William Klink, Vincent Rodgers, Wayne Polyzou, Meurice Yannick (in physics).

As the record shows, the MGCs have been successful in attracting under-represented groups (women and minorities) to our profession.

Scientific justification for the timing and program

Our scientific justification for MGC 07 is substantial (details below!)

It begins with Tom's planning for this 2007 version of the Midwest Geometry Conference. It was already well under way when he died so suddenly, only a few weeks ago. Moreover Tom's planning goes far beyond logistics; more importantly, it includes graduate courses Tom taught here on campus, work with postdocs, research collaborations, and quite a number of workshops and mini-courses Tom had organized and taught around the world, in Europe, in Singapore, and in Korea.

Conference details: <http://www.math.uiowa.edu/MGC2007/> .

Since Tom, shortly before he died, had discussed various logistics issues for MGC with some of us, we were able to step in and to continue Tom's preparations.

For example, Tom had already secured some financial support; and we immediately made sure that this (modest) partial participant support (from the NSF and from our university) will stay.

As it turned out in fact, there is now even more enthusiasm worldwide for the conference. As a result, it will likely be more ambitious than say the last two MGCs. That is good, but it also means that existing funding is disproportionately small. Especially when keeping in mind that the MGC conferences typically (but not always) have had a regional flavor.

Based on numbers from earlier MGC conferences, and on recent correspondence with colleagues, we expect that the total number of participants will be around 100, with a third from abroad. It is also clear that we will continue to successfully attract traditionally under-represented groups (women and minorities), as well as graduate students and younger researchers.

We have coordinated our plans for MGC 2007 with the organizers of related conferences and workshops, for example the 2006 IMA Summer Program, organized by Professors Willard Miller and Mike Eastwood. The 2006 IMA event will include a workshop and mini-courses for graduate students and postdocs. They will introduce the research topics which are planned for MGC 07. Indeed, we will be able to have MGC 2007 at the University of Iowa build directly on the 2006 IMA summer program.

The following link to our department website illustrates the potential impact of the proposed research, as well as the timeliness of each of the seven interrelated subject areas the conference will cover:

<http://www.math.uiowa.edu/bransonmemorial.htm>

Rationale, background, scientific justification, and outlook

Rationale: The conference will combine themes from geometry, physics, and symmetry. To a large extent it is motivated by Tom’s work which is a distinguished as a highly original blend of these three elements. Many of Tom’s collaborators are from around the country, and indeed from around the globe.

Background: In the 1980s Tom’s research on conformal invariance was significantly ahead of its time. In all his research Tom utilized to a great effect the natural interplay between this invariance and the underlying symmetry groups. Indeed, Tom’s work continues to motivate and inspire a thriving and impressive international research effort.

Scientific justification: These developments really took off and grew into active research trends in the 1990s, and they continue with even stronger momentum up to the present. Many of the invited main speakers have contributed to the various research trends that Tom started.

Tom is especially known for introducing an extremely important and subtle quantity known as “Branson’s Q-curvature,” now seen as absolutely fundamental in conformal geometry. And then Tom’s recent and very active work further developed Q-curvature, and it pursued many other aspects of symmetry, invariance, and geometry too varied to list here; many include applications to physics. The impact of what Tom started will always be felt.

A partial list of faculty from MSRI academic sponsoring institutions with interest in MGC 07:

- Georgia Institute of Technology:
 - Eric A. Carlen
 - Michael Lacey
 - Wing Suet Li
- Indiana University:
 - John L. Challifour
 - Jiri Dadok
 - Bob Glassey
 - Roger Temam
- Kansas State University:
 - Louis Crane
 - Gerald Hoehn
 - Alexander Ramm
- LSU:
 - Scott Baldrige
 - Jacek M. Cygan
 - Mark Davidson
 - Ray Fabec
 - Gestur Ólafsson
 - Boris Rubin
- Ohio State University:
 - Henri Moscovici
 - Steve Rallis
 - Robert Stanton

- Pennsylvania State University:
 - Paul Baum
 - Nigel Higson
 - John Roe
 - Victor Nistor
 - Adrian Ocneanu
- Purdue University:
 - Steven Bell
 - Harold Donnelly
 - Richard Penney
 - William Ugalde
- Rice University:
 - Robert Hardt
 - John C. Polking
 - Stephen Semmes
 - Mike Wolf
- Seoul National University:
 - Hyeonbae Kang
 - Hyeong-In Choi
- Texas A&M University:
 - Stephen Fulling
 - Peter Kuchment
- University of California, Berkeley:
 - F. Michael Christ
 - L. Craig Evans
 - Isadore M. Singer
 - Maciej Zworski
- UCLA:
 - James Ralston
 - Terence Tao
 - Veeravalli Varadarajan
- University of Georgia:
 - Malcolm R. Adams
 - Jason Cantarella
 - Joseph H. G. Fu
 - Ken Johnson
- University of Illinois, Urbana-Champaign:
 - Richard S. Laugesen
 - Dirk Hundertmark
- University of Iowa:
 - Fred Goodman
 - Oguz Durumeric
 - Charles Frohman
 - Palle Jorgensen
 - Vincent Rodgers
 - Walter Seaman
 - Lihe Wang

- University of Kentucky:
 - Russell Brown
 - Zhongwei Shen
 - Peter D. Hislop
 - Peter Perry
- University of Maryland:
 - Carlos Berenstein
 - Rebecca Herb
- University of Michigan:
 - Jeffrey Lagarias
 - John W. Lott
 - Hugh Montgomery
 - Scott Wolpert
- University of Missouri:
 - Mark Ashbaugh
 - Nakhle Asmar
 - Fritz Gesztesy
 - Alex Iosevich
 - Konstantin Makarov
- University of Notre Dame:
 - Brian Hall
 - François Ledrappier
- University of Pennsylvania:
 - Christopher Croke
 - Jerry L. Kazdan
 - Wolfgang Ziller
- University of Toronto:
 - James Colliander
 - Robert McCann
 - Israel Michael Sigal
- University of Wisconsin:
 - Sigurd Angenent
 - Mikhail Feldman
 - Aobing Li
 - Andreas Seeger
- Wayne State University:
 - Guozhen Lu

Outlook: Finally, we stress that Tom's recent work on a specific class of conformally covariant operators (nowadays often called Branson-Paneitz operators) has been extraordinarily influential, and it is widely cited. For example, it has led to Tom's collaboration with Alice Chang and Paul Yang (both at Princeton) on the functional determinants of the conformal Laplacians on 4-manifolds. This work in turn has spun off several new trends in geometry and in mathematical physics which are again currently extremely active.

On behalf of the organizers;
Palle Jorgensen, Professor of Mathematics, University of Iowa.
<http://www.math.uiowa.edu/~jorgen/>

Appendix: A list of Tom Branson's co-authors

- Ivan Avramidi, New Mexico Tech, iavramid@nmt.edu
- Collin Bennett, Loyola Univ, USA
- Novica Blazic, Univ. of Belgrade, Yugoslavia, blazicn@mathf.bg.ac.yu
- Neda Bokan, Univ. of Belgrade, Yugoslavia, nbokan@mi.sanu.ac.yu
- Andreas Cap, Univ. of Vienna, Austria, andi@esi.ac.at
- Sun-Yung Alice Chang, Princeton University, USA, chang@math.princeton.edu
- Michael Eastwood, Univ. of Adelaide, Australia, meastwo@maths.adelaide.edu.au
- Stephen Fulling, Texas A&M University, fulling@math.tamu.edu
- Peter Gilkey, Univ. of Oregon, USA, gilkey@uoregon.edu
- Rod Gover, Univ. of Auckland, New Zealand, r.gover@auckland.ac.nz
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- Juha Pohjanpelto, Oregon State Univ., USA, juha@math.oregonstate.edu
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- Paul Yang, Princeton University, USA, yang@math.princeton.edu
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