

SIAG Algebraic Geometry Charter Renewal Application

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Algebraic Geometry (SIAG/AG). The SIAM Activity Group (or SIAG/AG) to which this renewal applies was originally formed under the aegis of SIAM on July 2009 by the SIAM Council and by the SIAM Board of Trustees with its initial operating period beginning January 1, 2010 and ending December 31, 2011. This charter was renewed for a second and third term which ends 12/31/15. Its charter has been renewed by the Council and Board three times. This SIAG had 228 members, including 80 student members, as of 12/31/2014.

According to its Rules of Procedure, the objective(s) of the SIAG are to provide a research community gathering point for research in applications of algebra and geometry. The activity group will welcome participation from both theoretical mathematical areas and application areas not on this list which fall under these broadly interpreted notions of algebraic geometry and its applications.

Its purposed functions were:

- (1) Organize minisymposia at the SIAM Annual Meeting in years where there is no SIAG Conference.
- (2) At least once every five years either organize a track of at least six minisymposia at the SIAM Annual Meeting or have an activity group meeting held jointly with the annual meeting. The VP for Programs and the VP at Large will coordinate the scheduling with the SIAG chair.
- (3) Organize a biennial SIAM Conference on Algebraic Geometry. The SIAG will consider dovetailing specialized workshops and conferences with the SIAM Annual meeting or other SIAG conferences. The chair of the conference organizing committee shall be either the program director or the chairperson of the SIAG or their designee. The organizing committee must be approved by the VP for Programs at least 16 months before the conference.
- (4) With the approval of the SIAM Program Committee, the SIAG may organize special sessions at SIAM meetings, and conduct special one- or two-day meetings immediately before or after a regular SIAM meeting. Other SIAG meetings may be organized only with the approval of the SIAM president and vice president for programs.

The SIAG has complemented SIAM's activities and supported its proposed functions. The answers to the questions below indicate how this was accomplished and what the officers propose as the future directions for the SIAG.

- How is the field covered by the activity group doing? Is it growing, is the focus shifting? What have been the significant advances over the last [two/three] years?
Since it is such a broad field, any choice of advances is automatically unfair to other areas. So let me just mention two broad developments. One is the rapid advance of numerical methods in algebraic geometry. These have an enormous potential for applications both within mathematics (where they can to some extent replace much slower symbolic methods) and to problems in industry. The second is the geometry and algebra of tensor decomposition, which also has seen startling new results of relevance in areas ranging from computational complexity (theoretical CS) to model order reduction. Both of these topics were also prominent in a recent semester at the Simons Institute for

the Theory for Computing. But, as said, there are many more areas where advances are being booked: algebraic statistics, polynomial optimization, coding theory and cryptology, etc.

- How is the activity group doing? Is it remaining vibrant? Is the size of the SIAG stable or increasing? How is the SIAG keeping up with the changes in the field? How are the broader interests of SIAM reflected in the activities of the SIAG?

The membership is more or less stable. There are ups in months preceding conferences, and downs in other years. We have not yet fully exploited opportunities for growth (e.g. student members, members from developing countries), but we are working on this. We have also not yet fully exploited options to become more visible within SIAM, e.g. via the blog. On the other hand, a small number of our members have been working hard to compose an application for founding a SIAM journal related to the SIAG's themes.

- Please list conferences/workshops the activity group has sponsored or co-sponsored over the past three years, and give a brief (one sentence or phrase) indication of the success or problems with each.

The SIAG/AG organizes the biennial conference on Algebraic Geometry. This list of conferences may be found at: <http://www.siam.org/meetings/archives.php#AAG>

The SIAM Conference on Algebraic Geometry in 2011 had 307 attendees.

The SIAM Conference on Algebraic Geometry in 2013 had 386 attendees.

The SIAM Conference on Algebraic Geometry in 2015 will have 34 minisymposia; this is slightly fewer than in 2013, yet quite a success given that it will for the first time take place outside North America (namely, South Korea).

- Please indicate the number of minisymposia directly organized by the activity group at the last two SIAM annual meetings. When did the SIAG last organize a track at an annual meeting or meet jointly with the SIAM Annual Meeting?

At the SIAM AM 2012 the SIAG sponsored a track of 11 minisymposiums (counting multiplicities). In 2011,2013,2015 they were not present due to their own conferences. In 2014 the SIAG was not present either.

- Please indicate other activities sponsored by the activity group, to include newsletters, prizes and web sites. Have each of these been active and successful?

The AG has a Newsletter and a Wiki, both of which are kept up-to-date through input by the membership. The Newsletter appears more regularly now than it did before (about once per month except in summer).

- What activities are planned and proposed for the next period of the charter? Please describe scheduled and suggested future activities in detail.

We plan our biennial conference in 2017 as well as a track of minisymposia at the AM 2016.

- How can SIAM help the activity group achieve its goals?

SIAM does a great job already, guiding us in the organization of conferences and minisymposia, helping us with advertising themes close to our heart through SIAM publications, etc.

- How can the activity group help SIAM in its general role of promoting applied mathematics and computational science?

In many different ways. For instance:

- +*Over the last year, themes covered by the SIAG have been increasingly visible through various articles in SIAM News (one example is the article by Rekha Thomas on the Euclidean distance degree, another is the article by Jan Draisma on geometry and invariant theory for complexity lower bounds). They give strong examples of how algebraic and geometric methods are used in applied mathematics.*
- +*At our conferences we strive for a fruitful interaction between mathematicians interested in applications and researchers actually working in those applications in a broad spectrum ranging from cryptography and computational complexity to neuroscience.*
- +*A further interesting point made by one of our invited speakers in 2013, Ravi Vakil, is how applied/computational mathematics can have a profound influence on pure mathematics; this was illustrated by various theorems which would not have been proved without looking through “computational glasses”.*

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two year operating period beginning January 1, 2016-December 31, 2017.

Signed

Jan Draisma, chair of the SIAG on Algebraic Geometry

Date

April 14 2015.