

SIAG Algebraic Geometry (AG)
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 by the Council and Board seven times with the seventh term ending 12/31/23. As of 12/31/22 this SIAG had 385 members, including 178 student members.

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 seven 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.

List all current officers of the activity group (including advisory board, if relevant).

Chair, Greg Blekherman

Vice Chair, Kaie Kubjas

Program Director, Cynthia Vinzant

Secretary, Cordian Riener

1. 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 years?

The field is experiencing healthy and exciting growth. The main directions include algebraic methods in data science, biology, and physics, coding theory and cryptography, quantum information theory, algebraic statistics, polynomial optimization, tensors, symbolic and numerical computation, algebraic vision, and algebraic topology. A strong focus on the algebraic geometry of data science and machine learning is a continuing trend. Moreover, algebraic methods in cryptography, coding theory, and algebraic vision are also gaining more importance in the field.

The variety of topics represented by the activity group is reflected by the numerous minisymposia organized at the upcoming SIAM Conference on Algebraic Geometry.

Here are some notable recent developments:

June Huh was recently awarded a Fields medal for the work connecting algebra and combinatorics. He was a plenary speaker at SIAM AG15. His work is related to the work of several members of the activity group and is represented in multiple minisymposia planned for SIAM AG23. This will elevate the visibility of the area within the mathematical community.

SI(AG)² member Alicia Dickenstein was awarded the 2021 L'Oreal-UNESCO International Award for Women in Science.

The paper [Learning to Solve Hard Minimal Problems](#) by Petr Hruby, Timothy Duff, Anton Leykin, and Tomas Pajdla was awarded the best paper award at CVPR 2022, one of the most prestigious conferences in computer vision. This highlights a continued impact of algebra in computer vision. Leykin and Pajdla are SI(AG)² members. Pajdla is also on the organizing committee of SIAM AG23.

The book, ["Invitation to Nonlinear Algebra,"](#) by Mateusz Michałek and Bernd Sturmfels, published in 2021, gives an excellent introduction and overview of Nonlinear Algebra to newcomers in the field. Sturmfels is an SI(AG)² member.

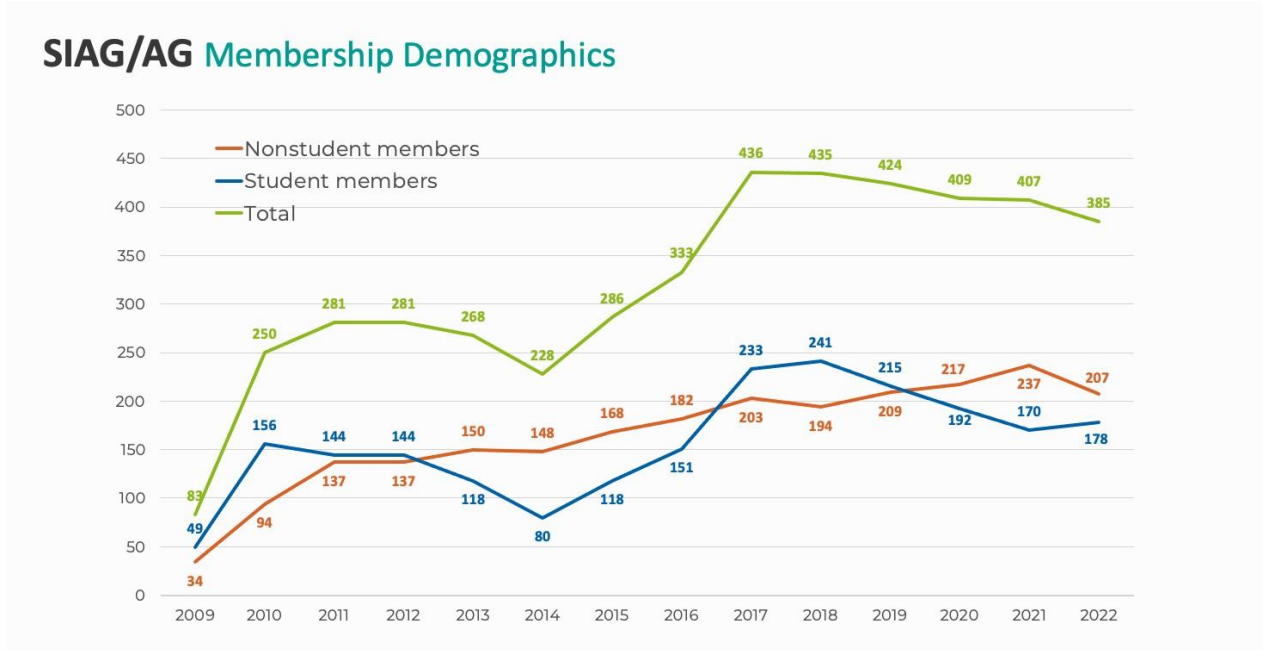
The long program, ["Algebraic Statistics and Our Changing World,"](#) will take place at the Institute for Mathematical and Statistical Innovation in Chicago in Fall 2023. The program will focus on mathematical and statistical challenges arising in our changing world, e.g., climate change and inequity in daily living activities. Four of the eight organizers of the program (Drton, Petrovic, Rodriguez, Sturmfels) are SI(AG)² members.

2. 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 activity group is quite vibrant. SI(AG)² members are leading the way in finding and developing algebraic applications in several areas (see Question 1). Many of the notable advances in the area were either made by SI(AG)² members or published in the SIAGA journal.

SI(AG)² activities include:

- a high number of minisymposia sessions at the SIAM Conference on Algebraic Geometry;
- the SIAM Journal on Applied Algebra and Geometry associated with the activity group;
- regular submissions to the monthly newsletter.



There has been a decrease in membership in the last five years; in 2022, the number of student members started increasing after decreasing for three years. There was a decrease in the number of non-student members in 2022 after a steady increase in the previous years.

We think that activity group membership has been influenced by the COVID-19 pandemic. The last in-person SIAM Conference on Algebraic Geometry was in 2019, followed by the COVID-19 pandemic. We expect the number of non-student members to increase again in 2023, with the SIAM Conference on Algebraic Geometry taking place in July 2023.

The broader interests of SIAM are reflected in the variety of backgrounds of the activity group members (employer, gender, and geography) and the diversity in the applications covered by the SIAM Activity Group on Algebraic Geometry.

3. 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.

SI(AG)² sponsors the biennial SIAM Conference on Algebraic Geometry:

SIAM Conference on Applied Algebraic Geometry (AG21), August 16-20, 2021, virtual event. The conference was planned to take place at Texas A&M University, College Station, TX, but due to the COVID pandemic took place as a virtual event. This conference had 602 participants, 109 minisymposia sessions, and 2 sessions for contributed presentations. Compared to AG19, the number of participants decreased from 756 to 602, and the number of minisymposia sessions decreased from 163 to 109, which is expected since AG19 was an in-person event and AG21 took place virtually. AG21 had more participants than any earlier SIAM Conferences on Algebraic Geometry before AG19.

SIAM Conference on Applied Algebraic Geometry (AG23), July 10-14, 2023, TU Eindhoven, Netherlands. The conference will have 128 minisymposium sessions, 8 contributed sessions, and a poster session. Registration for the conference will start in May 2023.

Additionally, members of the SI(AG)² activity group have actively organized conferences, workshops, and summer schools. A full list of current and past events in the field can be found at http://wiki.siam.org/siag-ag/index.php/Current_events.

4. 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?

There has been no minisymposia directly organized by the activity group at the last two SIAM annual meetings. In 2018, SI(AG)² organized a track of 10 minisymposia at the 2018 SIAM Annual Meeting (AN18). SI(AG)² is planning to run a track at the 2024 Annual Meeting.

5. 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 SI(AG)² activity group sponsors the following activities:

- The SI(AG)² Early Career Prize, awarded to an outstanding early career researcher in the field of algebraic geometry and its applications for distinguished contributions to the field in the three calendar years prior to the year of the award. The prize was established in 2016 and awarded every two years.
- Newsletter, delivered every month via SIAM Engage. The popularity of the newsletter is demonstrated by regular submissions to the newsletter by SI(AG)² members.
- Wiki page http://wiki.siam.org/siag-ag/index.php/Main_Page with a full overview of upcoming conferences, virtual seminars and job deadlines in the field.
- Facebook group with posts on conferences, jobs, news articles, prizes and other relevant items related to applied algebraic geometry. The Facebook group is very popular and has over 1000 members.

The SIAM Journal on Applied Algebra and Geometry (SIAGA) is the SIAM journal best associated with the SI(AG)². The SIAGA journal has gained an outstanding reputation in the community and is able to attract most of the significant advances in the field. Since January 2022, the Editor-in-Chief is Jan Draisma.

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

The following activities are proposed for the next period of the charter:

- SIAM Conference on Applied Algebraic Geometry (AG25). Since AG23 takes place in the Netherlands, we expect AG25 to be held in the US or Canada.
- Soliciting nominations for the SI(AG)² Early Career Prize, which will be awarded at AG25.
- Monthly newsletter distributed via SIAM Engage.
- Maintaining an up-to-date wiki page with a full overview of upcoming conferences in applied algebra and geometry.
- We plan to organize minisymposia at the 2024 SIAM Annual Meeting.

7. How can SIAM help the activity group achieve its goals?

It is very important for the health and continued growth of the activity group that registration fees for SIAM AG Conferences are kept low. The group is making an effort by hosting all conferences at universities to keep the fees as low as possible.

SIAM can help SI(AG)² by supporting a further increase in the presence of the SI(AG)² members in SIAM governance. This will encourage representing the interests of the activity group in SIAM and closer cooperation with other activity groups.

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

The SIAM AG Activity Group is making progress in reaching out to communities in Coding Theory, Cryptography, Computer Vision, and Data Science, among others, as evidenced by minisymposia at recent and upcoming SIAM AG conferences. This effort will result in increased membership and vibrancy in the group.

SI(AG)² is helping SIAM by increasing visibility via high-quality publications in the SIAM Journal on Applied Algebra and Geometry (SIAGA) as well as other SIAM publications such as SIAM Journal on Discrete Mathematics (SIDMA), SIAM Journal on Matrix Analysis and Applications (SIMAX), SIAM Journal on Numerical Analysis (SINUM), SIAM Journal on Mathematics of Data Science (SIMODS), and SIAM Journal on Optimization (SIOPT).

SI(AG)² also contributes to the cross-interactions between different communities in applied mathematics and computer science, participating in conferences such as SIAM Conference on Optimization and the SIAM Conference on Computational Geometric Design, and SIAM Conference on Discrete Math.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2024.

Signed,



Greg Blekherman, Chair of the SIAG on Algebraic Geometry

05/19/23

