

Weekend Getaway Guide: A Mathematics Research Conference

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Like many mathematicians, I occasionally miss class in order to attend a research conference. When I explain the reason for my upcoming absence, the incredulous look on my students' faces says it all: *You're traveling there? To do math? And listen to math talks all day? Over the weekend?* As a graduate student, you might feel the same way. After all, who wants to do work over an entire weekend? The truth is that mathematics research conferences are an integral part of being a mathematician; and yes, as a graduate student you are a mathematician! Although the idea might be unappealing or intimidating at first, graduate school is the time to begin attending research conferences. Ultimately, attending and participating in research conferences will help you write your dissertation, get a postdoc or a job, and move through the tenure process of academia.

Mathematics conferences are unique in many ways, and even within mathematics they will differ between research areas. This article is designed to be a "travel guide" to help you attend your first several math meetings. If you start attending math conferences early in your mathematical career, and attend them on a regular basis, you will begin to build a network of colleagues in your research area. This network can have a profound influence on your entire mathematical career. Attending conferences will also help you broadcast your research to other mathematicians in your area of specialty and learn new mathematics. In turn, you will be establishing yourself as an active member of your research community.

Before the guide begins, you might be wondering what mathematics research conferences are or why they exist. Like professional conferences in other disciplines and professions, math conferences serve to bring together mathematicians who are all interested in a common topic.

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Contrary to popular belief, mathematicians are not solitary workers. In fact, we are very social and rely on collaborations, both formal and informal, to make progress in our respective fields. For this reason, mathematicians gather on a regular basis across the world to present new mathematical ideas, to discuss research themes and open questions, and to interact with colleagues who work at different institutions.

Where Should I Go? Choosing a Conference to Attend

You do not necessarily need to have a thesis advisor or a dissertation topic in order to attend a research conference. In fact, there are no prerequisites for attending most math conferences. Once you have decided on an area of interest, you can, and should, start searching for meetings that suit you. A good place to find upcoming conferences is on the AMS website, under the heading Meetings. Here you will find a list of upcoming national, international, and sectional meetings of the AMS (more on these later) and also a Mathematics Calendar, which compiles other upcoming conferences with links to their websites. There are dozens of conferences listed on the Mathematics Calendar, and most will not be interesting to you. Use the search command to find the conferences related to your interests, such as "Analysis" or "Geometry". If you check this calendar regularly, you can also search the term "New" to see what has been added in the past week. Your specialty may be a very specific branch of mathematics, so broaden the subject area when looking for conferences.

Your department may also post announcements for conferences, and you can ask your advisor or another faculty member in your research area to alert you to upcoming meetings. Other good ways to learn about upcoming conferences are to add your address to an email list for your research area and to regularly check the schedule of the NSF-sponsored math institutes: AIM, IAS, ICERM, IMA, IPAM, MBI, MSRI, and SAMSI. In order to find good conferences to attend and to sign up before

deadlines pass, you should be checking for upcoming meetings on a routine basis.

Math meetings have many different formats. They vary in number of participants, length, and types of talks. On one end of the conference spectrum is a workshop. The goal of a workshop is generally to get mathematicians together in one place to work on a specific problem or group of problems. Some workshops are targeted toward senior researchers (though young mathematicians are still included), while others are specifically aimed at graduate students and recent Ph.D.s (this term usually refers to mathematicians who received their Ph.D.s in the past three or five years). These conferences generally last a week or more and often occur in the summer. A typical workshop for graduate students and recent Ph.D.s is run by several senior researchers and includes talks targeted toward beginners in the field. There will usually be a series of talks on one subject, and in addition there may be some new results or open questions presented. Attending workshops aimed at junior researchers as a graduate student is beneficial on many levels. First and foremost, since the conference is aimed at beginners in the field, you should understand more of the talks. Workshops can supplement what you have learned in your graduate courses and can also introduce you to new research areas. Another benefit of attending workshops is that you will meet other graduate students in your area of specialty. These students will be your colleagues for many years to come, and some will also become coauthors or friends. For this reason, the environment of a workshop is often very conducive to interacting socially with other participants.

Another type of research conference is one at which researchers present new mathematical findings. These conferences often span a weekend (two–three days), but can also run a week or longer. They generally consist of a series of longer talks (roughly one hour each) by invited speakers, who tend to be well-established or up-and-coming researchers in the field. Sometimes these meetings include sessions of shorter talks by participants, usually called contributed talks. You do not have to be invited to give a contributed talk, and once you have research results, you should strongly consider applying to give one. You will be able to share your research with an audience of mathematicians in your research area and gain visibility by giving a contributed talk. Moreover, if you give a contributed talk, the organizers are more likely to provide financial support to attend the conference. The application to give a contributed talk is usually not competitive; applying means submitting a title and abstract, and graduate students are always encouraged to apply. Keep in mind that, although it may seem intimidating to give a talk at a conference attended by experts in your field, presenting

your work is a vital part of being a mathematician, and it is easiest to begin practicing as a graduate student.

A third type of conference is an AMS national or sectional meeting. These conferences are run by the AMS and happen at regular intervals. Each AMS section (Eastern, Southeastern, Central, and Western) has a meeting in the fall and in the spring every year at different colleges and universities. AMS sectional meetings occur over a weekend and consist of special sessions and invited talks. Special sessions are organized by volunteers who invite speakers to attend and give talks. The length of talks in a special session is usually set at twenty minutes. The four one-hour invited talks are chosen by the AMS and the local organizing committee. The national conference, also called the Joint Mathematics Meetings, occurs every year in January. This conference has a similar format to the sectional meetings but on a much larger scale. AMS meetings do not provide financial support for any speakers or participants. Other mathematical organizations, such as SIAM and the MAA, also host meetings throughout the year.

Aside from AMS meetings, most conferences have some funds to provide financial support to participants. These funds are usually provided by a national organization, such as the NSF or the NSA, or by the hosting university, and monies are often set aside for graduate students and recent Ph.D.s. In other words, as a graduate student, you can often attend conferences for free! Before you get too excited, keep in mind that this “free trip” is not a vacation. In other words, you most likely won’t be staying at a deluxe resort or visiting popular tourist sites. Instead, you will probably be spending six or eight hours in a classroom or auditorium listening to lectures. Nevertheless, attending conferences does provide opportunities for visiting new places and experiencing other college and university campuses.

In order to receive financial support to attend a conference, it might be necessary to give a contributed talk, submit a CV or short statement about your research, or provide a letter of support from your advisor. After you apply for support, wait to hear back from the organizers before buying plane tickets or making hotel reservations. The organizers will provide you with instructions on how to get reimbursed and the maximum amount that they can reimburse you. This is all important information. A final word on the subject of financial support: always keep your receipts!

What Should I Pack? Things to Do before You Attend a Conference

Once you have decided to attend a conference, there will be several logistical details that require your attention. Visit the conference website to learn the details of where to stay, how to get there, and how to get reimbursed. Be sure to take notice

of any deadlines, such as for abstract submission or reserving hotel rooms. Do not assume that these deadlines are soft! Missing deadlines inevitably causes more work for the organizers, and as a graduate student or recent Ph.D., this is not how you want to be remembered.

The most important information available on the conference website is the list of speakers or participants. Look over this list in advance of the conference and do some research on the speakers. You may recognize some names on the list, but probably there will be others that are unfamiliar. Find the speakers' home pages. Look around and try to get a sense of who they are (e.g., institution, rank, Ph.D. advisor, etc.) and what they do mathematically. To answer the latter question, you might also want to use MathSciNet or the Math arXiv to find recent publications and coauthors. There is no need to read every paper to learn the technical details of what they have each proved. Instead, aim to scan some abstracts to get a general sense of the research expertise of each speaker.

Another great way to prepare for conferences is to regularly attend a departmental seminar in your area of interest. By attending seminars, you will begin to learn what types of research questions are interesting to mathematicians in your field. Even if you do not understand the seminar talks, try to understand some general ideas of what the talk is about. If you can, make an exercise of writing down one or two sentences about each talk you attend, and also a question. Save these pieces of paper: they might make more sense to you in the future. Work up the courage to ask your question to the speaker. Also, if there is a group going to lunch or dinner, ask to be included. You will gain valuable experience interacting with mathematicians and get the opportunity to meet researchers from other institutions. The ritual of listening to research talks, discussing mathematics, and sharing a meal will be repeated over and over at conferences, and it is more comfortable to begin doing all of these things at your home institution.

Pack comfortable, casual clothes. By now you have enough experiences with mathematicians to know that they are not formal dressers. And, after all, it is the weekend.

What Should I Do while I'm There? Maximizing Your Time at a Conference

Now that you've arrived at the conference, take a look at the schedule if you have not already seen it posted online. If there are parallel sessions (meaning that two or more talks take place at the same time in different locations), mark the talks that you want to see based on the research you did before the conference. Even if there is only one session of talks occurring, put a star next to the talks that you don't want to miss. It is no secret that mathematicians skip talks, and no one will be taking attendance. Nevertheless, as a graduate student

your goal is to network with the participants, so you want to be present as much as possible. As a young researcher you will probably spend most of your time at conferences attending talks. As a more senior researcher, however, you may find it more beneficial to spend less time at talks and more time interacting with other mathematicians. Nonetheless, conference talks are always a touchstone for generating conversation among participants.

Keep your expectations of what you will learn from the talks at a conference reasonable. You will be overwhelmed with information, most of it above your head, in the next few days. If you have been attending seminar talks at home, then this will not be a surprise. Do not feel intimidated or frustrated, and do not give up and leave a talk. Continue your exercise of writing down at least one or two ideas from each talk and a question. If a talk is of interest to you, then you may want to take extensive notes. Another suggestion is to keep track of the names that the speaker references in his or her talk. After keeping track of these individuals for a while, you can begin to see how your research area developed over time. You will also see patterns emerge of certain groups who work on similar problems and thus learn about different subgroups within your specialty area.

If you are giving a contributed talk, make sure that you have prepared well for your presentation (for more on how to prepare a research talk, consult one of many guides available, such as John McCarthy's pamphlet "How to give a good colloquium", distributed by the AMS, or Steven Krantz's book *A Mathematician's Survival Guide*). Make sure to have the proper technology (e.g., laptop, flash drive, or transparencies) and a backup. It is always a good idea to email the organizers before you travel to confirm what will be available in the lecture room. Stay within your allotted time and make sure to thank the organizers for the opportunity to speak. Pay attention to who is in your audience, and introduce yourself to these participants either right after your talk or during another break in the conference. Try to engage these people in a discussion about your talk. You might want to ask them if they had any questions, or you can continue where your presentation left off by discussing what research questions you will be exploring next. Even though giving a talk can be nerve-racking, having a large audience or several questions at the end of your talk is a good thing. When participants ask questions, it means that they find your research interesting (or, at the very least, they paid attention to you for twenty minutes, which is no small feat). If you get a question that you cannot answer, write down the question and who asked it, and try to find an answer when you get home.

Research talks are the focal point of most mathematical conferences. However, as a

participant you should consider the time in between and after talks as equally important components of the conference. Mathematicians have their own unique culture, and many of their cultural rituals happen outside of talks. All conferences have scheduled tea breaks during the morning and afternoon. This break of twenty-thirty minutes is a time set aside for informal discussions and caffeine consumption. Mathematicians will often talk about the results presented in the preceding sessions. As much as possible, integrate yourself into these discussions. At tea time, join a group and introduce yourself. Be assertive and eager to talk about yourself and your research. When others are talking, listen carefully to what is being discussed. Try to get a sense of what they deem important. For instance, did they find one talk particularly interesting? Or did they find one result very surprising? As a graduate student it is often impossible to see the big picture of your research area. Partaking in these informal discussions may help you better understand the history and development of your research area, as well as point you in the direction of what problems are interesting to active mathematicians.

Another opportunity for informal interaction with conference participants occurs in the evenings after the talks have finished. There may be an organized banquet or party, and as a graduate student you may worry that you are “not really invited” or are otherwise excluded from these activities. This is absolutely the wrong approach, and you should participate in every activity the conference has to offer. If there is no organized dinner, most mathematicians will form groups to go out to dinner, and you should invite yourself along. Dinner is usually a relaxed occasion, with many people having a drink and discussing a wide variety of topics in addition to mathematics, such as the weather, sports, or university administrations.

As you get to know the members of your research group, you will learn that they tend to gravitate toward certain conversational topics. You may also learn that they have strong political feelings or other strong opinions. As a newcomer, this may be surprising, and you should carefully observe how the group interacts. You do not have to change yourself in order to fit in, but you want to gauge how to act in a manner that is friendly and professional. In rare cases, you might find yourself in an awkward situation over dinner. Your companions might order a very expensive bottle of wine and expect you to share in the cost even if you did not drink a glass, or you might find yourself seated between two people having a conversation in a foreign language. Find a way to be polite but also assert yourself.

In summary, as a graduate student your goals at a research conference are to meet as many mathematicians in your area as you can and to

promote your own research. Remain upbeat and enthusiastic about your research and take every opportunity available to discuss your mathematical results and activities. The mathematicians you meet at conferences will have a huge impact on your mathematical career. These men and women may, in the near future, write you a recommendation letter for a job or be a postdoctoral mentor. In the longer term, these colleagues could potentially write a paper with you, support your job application to their institution, rate your grant application, peer review one of your research papers for a journal, or write a letter for promotion and tenure. In summary, your entire career will be shaped by the opinion of mathematicians in your research area. There is no benefit to “sucking up” to these individuals, but you should make every effort to meet mathematicians in your specialty and share your research with them. These encounters may seem inconsequential, but they can have a huge impact on the entire span of your mathematical career.

What Souvenirs Should I Bring Back from the Trip? Things to Do When You Return from a Conference

After you return from a conference and catch up on some sleep, take the time to organize everything that you collected from the meeting. If you gave a contributed talk, add the talk to your CV. Save a copy of the program in which your name is printed, and keep this in a folder dedicated to materials of this type. If there were unanswered questions from your talk, you should try to find an answer and, if possible, send an email to whomever posed the question. If there was a preprint that interested you, download the paper from the arXiv or email the author for a copy. Read or file these documents where you can refer to them later. Finally, you should send a short email thanking the organizers and take care of any reimbursement paperwork.

After attending one or two conferences, the overall experience should get easier and more enjoyable. You will begin to see familiar faces at conferences and develop collegial relationships with some participants. In other words, you will no longer be the random person at the dinner table. More important, you will become more comfortable talking about math to new people and more at ease giving research presentations. The purpose of attending conferences as a graduate student is for all of these activities to eventually become second nature.

In time, you will transition from a new researcher to an established researcher in your area, and your role at conferences will change. Remember what it was like at your first few conferences, and help graduate students and junior researchers by including them in discussions and inviting them to dinner.