

Information for NSF travel grant application, Applied Category Theory 2018

In response to program solicitation here: <https://www.nsf.gov/pubs/2016/nsf16550/nsf16550.htm>

Responses to instructions

Offer a strong scientific reason for the proposed activity

I'll let you write this. The proposal we submitted to the Lorentz Center is here:

https://github.com/thelastjosh/act2018/blob/master/lorentz_proposal.pdf

Distinguish the planned project from other conferences and activities, particularly from recent or similar activities

Similar recent events include:

- Special session on Applied Category Theory at AMS Western Sectional November 2017
http://www.ams.org/meetings/sectional/2243_special.html
- 1st Workshop on String Diagrams in Computation, Logic, and Physics (STRING 2017)
<http://string2017.cs.ru.nl/>
- ISI workshop on Categorical Foundations of Network Theory 2015
http://math.ucr.edu/home/baez/networks_isi/
- NIST workshop on Computational Category Theory 2015
<http://www.appliedcategorytheory.org/?p=62>
- Categorical Methods at the Crossroads, Dagstuhl 2014
<https://www.dagstuhl.de/en/program/calendar/semhp/?semnr=14182>

This event is larger (65 participants at peak), with a focus on younger members of the community (20 participants). Most importantly, it includes a training component: the younger members will

Justify, if appropriate, how well any prior NSF support was used in preliminary or precursor activities

No prior NSF support has been received for precursor activities.

Devote substantial funds to support participation by individuals who do not have other federal support, or who are students, post-doctoral scholars, or from under-represented groups

The money will go predominantly to this group. US speakers are currently you, David Spivak, and Aaron Ames (not yet confirmed). We have currently budgeted to cover your hotels, but not your travel, although there is still some discretionary money available. If you would like to include some money for yourself in this grant, feel free to do so. I would like to draw some money from this grant if it's awarded (and since I can still be counted as a junior participant).

Perhaps we can apply for money for 6-8 US students (the Kan II Seminar last year had 5 of 8 students based in the US), me, and a bit of speaker money? We can see if we can find a cheaper hotel, but the recommended Lorentz Center one is about €100/night, and we'll need 12 nights for each student, plus airmiles. This comes to perhaps USD2000 per participant, so we'd apply for about USD16,000-20,000? This seems comparable to other grants I've seen.

Describe plans to recruit and involve a diversity of participants, both individuals and institutions;

Widely advertised application process (blogs, mailing lists, website) for the school. Will include statement encouraging diverse participants to apply(?). Selection essentially merit based, weighted to encourage diversity at the discretion of the organisers.

Essentially: same as for Kan Extension Seminar, which seems to have worked well.

Describe plans for disseminating results of the activity.

In the leadup to the school, 8 preparatory articles, written by the participants of the online seminar, will be posted on the widely read mathematics blog [The n-Category Cafe](#). These articles will summarize key papers and provide an easily accessible entry point to some of the main themes in applied category theory.

Slides and videos will be made available online at the [Oxford Quantum Video](#) YouTube channel and the [Applied Category Theory](#) website, which is largely devoted to this conference and possible followups.

A technical report summarising presentations and discussion sections will be posted online.

We are looking into plans for a proceedings volume.

Plans for further conferences and community building activities will be discussed.

Response to detailed questions

What is the purpose of this activity? How is it different from others?

Goals include:

- introduce early career researchers to applied category theory
- form research community/have different communities talk to one another
- make progress on basic conjectures
- communication on key problems/direction of the field

What is the scientific focus? Why is this topic timely and important?

How will the activity or conference be structured? Be specific.

The event will have three distinct parts.

First, an **online reading seminar** (16 students, 2 facilitators, January to April 2018). The online seminar will run eight iterations of a two week block. Each block will have one paper (or similar) as assigned reading, and two researchers as leaders. Each block has three phases:

1. A discussion on the assigned reading over google hangout. This will usually take the form of a presentation by the leaders, followed by questions.
2. Reading responses on a private forum from each of the other participants, moderated by the facilitators.
3. Publication of a blog post on the n-category cafe on the assigned reading by the leaders, followed by public discussion. This will take place approximately one week after the talk.

The seminar will begin in the second week of January, and run until the workshop. The reading will be chosen by the mentors at the school.

This follows successful Kan Extension Seminar model:

<http://www.ams.org/notices/201411/rnoti-p1357.pdf>, <http://www.math.jhu.edu/~eriehl/kanII/>.

Second, a **research school** (23 participants (16 students, 2 facilitators, 4 mentors/lecturers, 1 guest lecturer), April 23-26).

Each morning will comprise three one hour lectures to the entire group, given by the mentors. After lunch, we split into working groups. Each mentor will work with the four researchers who led the online discussions on the two papers they assigned. The working groups will work on conjectures outlined by the mentors at the beginning of the seminar. The aim will be to, in the weeks following the workshop, write up results for publication.

Third, a **cross-community workshop** (65 participants, April 30-May 4). This will be discussion focused. Four themes: causality, concepts/cognition, dynamical systems/networks, systems biology. Approximately three hours of invited talks per day, one afternoon of lightning (~8 minute) talks, and the remainder of the time for semi-structured discussion and collaboration. Office space will be provided.

Preliminary chedules for the Workshop and Research School can be found here:

<https://docs.google.com/spreadsheets/d/1Qnzv-zSNWQe4SX0SU-120X-PyENzOExFDeHd42cGv0c/edit#gid=0>

The funding will be used so that the participants in the reading seminar can attend the research school and workshop.

Who will be involved? If there is an organizing committee, who are its members? If there is a management team, who are its members? If multiple institutions are involved, what is

the overall management plan? Who are the planned senior participants (e.g., invited speakers, session directors)?

Organising committee:

- Bob Coecke (Oxford)
- Brendan Fong (MIT)
- Martha Lewis (Amsterdam)
- Aleks Kissinger (Radboud)
- Joshua Tan (Oxford)

Management team:

- Lorentz Center

School lecturers:

- John Baez (UC Riverside, CQT Singapore(?))
- Martha Lewis (Amsterdam)
- Jürgen Jost (MPI, guest lecturer)
- Aleks Kissinger (Radboud)
- Pawel Sobocinski (Southampton)

Workshop speakers:

- Samson Abramsky (Oxford)
- Aaron Ames (Caltech)
- John Baez (UC Riverside, CQT Singapore(?))
- Andrée Ehresmann (Picardie Jules Verne)
- Mikhail Gromov (NYU, IHES)
- Helle Hvid Hansen (TU Delft)
- Kathryn Hess (EPFL)
- Bart Jacobs (Radboud)
- Tom Leinster (Edinburgh)
- Gordon Plotkin (Edinburgh)
- Jurriaan Rot (Radboud)
- Mehrnoosh Sadrzadeh (QMUL)
- Nicoletta Sabadini (Insubria)
- David Spivak (MIT)
- Fabio Zanasi (UCL)

How will participants be recruited and chosen? If appropriate, how will the activity be widely advertised, so that broad participation can be achieved? What steps will be taken to ensure diversity (women, minorities, persons with disabilities; institutional; geographical; and other aspects of diversity)?

Participation for senior participants is predominantly by invitation, selected for previous work on applied category theory. The aim is to bring together a number of different communities. We have made an attempt to invite participants from industry as well as academia. Total of 45 senior participants (workshop week only).

Participation from junior participants will be by application, advertised predominantly online (eg n-category cafe) and by mailing list. (This has been very successful in the past (eg for Kan Extension Seminars.) Total of 20 junior participants.

A workshop poster is in preparation.

Here are workshop websites:

<https://lorentzcenter.nl/lc/web/2018/969/info.php3?wsid=969&venue=Oort>

<https://lorentzcenter.nl/lc/web/2018/971/info.php3?wsid=971&venue=Snellius>

<http://www.appliedcategorytheory.org/> (A bit out of date.)

5 of 15 invited speakers are women (see above); geographical and institutional diversity seems reasonable (not sure how to measure); no other diversity measures.

Some funds are also provided by the Lorentz Center (9325 euros + conference dinner and admin assistance)

Further efforts are underway to provide travel grants to junior members from the UK/Europe (via John Fell Fund, KNAW).

This grant will help ensure young members of the community that are based the US will be able to attend.

Where and when will the activity be held? What facilities will be used?

Lorentz Center, Leiden, The Netherlands. The school will take place April 23-26, the workshop April 30-May 4, 2018. The Lorentz Center is a dedicated venue for scientific workshops, and will provide all facilities (lecture rooms, discussion rooms, common space, offices).

See here <https://www.lorentzcenter.nl/facilities.php> for many more details and photos.

What steps will be taken to disseminate the results of the activity?

See above.

Review criteria

1. What is the potential for the proposed activity to
 - Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?

5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Some relevant quotes/things to keep in mind

"In addition, NSF requires that conferences or meetings and the facilities in which they are held must be accessible to participants with disabilities if the events are funded in whole or in part with NSF funds."

- As far as I know the Lorentz Center is fully accessible. I could request explicit confirmation of this from our workshop coordinator if it would help.

"Involvement of students and junior investigators and of individuals from groups under-represented in the mathematical sciences, in order to contribute to the development of the nation's science personnel base"

"For conference, workshop, and similar proposals, most funds are expected to be devoted to the support of participants who have no other federal support and participants who are students, post-doctoral scholars, or members of groups that are under-represented in the mathematical sciences."

"In general, funding to support participation in conferences held abroad is very limited. Requests for international travel by groups of US-based mathematical scientists, which ordinarily originate with US educational institutions or professional scientific societies, will be considered. Support for such group travel is intended only to facilitate US participation in a foreign-based conference or workshop that would run as a high quality event even without DMS-supported participants. DMS will not support a significant portion of the main speakers or participants at an event held abroad"

- I think this fits us precisely, we just need to emphasise that this is for US-based students/postdocs to attend an existing European event