

Symmetry in Computational Complexity

CoCoSym

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About me

- ▶ 2006 PhD in mathematics (MFF UK)
- ▶ 2006–now Department of Algebra, MFF UK
- ▶ 2010–2012 McMaster University, Hamilton, ON, Canada

About CoCoSym

- ▶ panel PE6: Computer Science and Informatics
- ▶ team: 3 PhD students, 3 postdocs (now 2+2)
- ▶ 5 years

Examples of computational problems

- ▶ **IN:** two numbers **OUT:** their product
- ▶ **IN:** timetable of connections, 2 cities **OUT:** fastest way

Computational complexity: How much time is needed to solve it, depending on the size of the input

Fact: In a (tiny) class of computational problems, the complexity is captured by a certain mathematical object

My viewpoint: In this class, the complexity is captured by symmetry

My dream: The complexity is captured by symmetry. Everywhere.

Why bother: to understand; to solve fundamental problems in theoretical computer science

Part B1: evaluated in the 1st step, by panel members

B1, Synopsis: 5 pages

- ▶ exciting and original long-term vision
- ▶ barriers, concrete steps to break through them
- ▶ it is the right time to do it
- ▶ I'm the only one who can do it

B1, CV: 2 pages

- ▶ established scientific school (PhD's)
- ▶ service to community (scientific meetings)
- ▶ experience (long-term stays, grants, collaborations)

B1, Track record: 2 pages

- ▶ excellence, independence
- ▶ papers, invited lectures, awards

Part B2: 15 pages, evaluated in the 2nd step, by external reviewers

B2, State of the art: promising

B2, Methodology: novel, excellent research environment

B2, Resources: short

- ▶ good for community
(my area; my department, faculty, university)
- ▶ prestige
- ▶ reasonable money for me, postdocs, and PhD's
- ▶ to clarify the long-term goals
- ▶ pressure from colleagues (Jiří Tůma, Zdeněk Strakoš)

- ▶ whole life: big goals, depth **and breadth**
- ▶ 1 year ahead: thinking about the proposal, testing
- ▶ 1+1 month: intensive work + polishing etc.
 - ▶ I felt the project had been well thought through, ...

Start earlier than me!

Before the proposal

- ▶ **good research environment:** big thanks to Jiří Tůma!
- ▶ open, friendly, international (members, visitors)
reading papers and attending conferences is not enough
- ▶ reasonable teaching load
(not too much, courses to attract PhD students)
- ▶ being active in the community (eg. organizing conferences)
- ▶ long term stay abroad

Writing the proposal

- ▶ great help from Zdeněk Strakoš: big thanks!
- ▶ ERC information days, workshop, mock interview
- ▶ proposals of other people, web browsing

Is helping now

- ▶ **good research environment**

I will not apply, because. . .

- ▶ my field is not in the mainstream. **Neither is mine.**
- ▶ my CV is not super strong. **Neither is mine.**
- ▶ the paperwork is surely terrible. **It's not.**
- ▶ I hate writing proposals. **So do I.**
- ▶ I am not able to write a great proposal. **The proposals are not super great.**
- ▶ I don't have time. **Neither did I.**

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Thank you!