International Conference on Large-Scale Experiments - Reflecting on Theories and Practices

Thursday 08 December 2022 - Saturday 10 December 2022

KIT Triangel, Karlsruhe, Germany

Programme

Plenary Sessions
Confirmed Speakers
Hanne Andersen (University of Copenhagen)
Tiziano Camporesi (CERN)
Gerd Graßhoff (Humboldt University Berlin)
Martina Merz (University of Klagenfurt)
Kent Staley (Saint Louis University)
Janet Vertesi (Princeton University)

Symposium - Going Large: the Bigger the Riskier? Epistemic Risks in Large Scientific Research

Organized by Marianne van Panhuys

This symposium aims to focus on risks of epistemic failure and of potential harms arising from large-scale scientific research as well as on the ways to deal with these risks. Today's scientific research can be "large" in multiple ways, either on a material, organizational, or technological level, and are often accompanied by an increasing use of computational methods to manage large amounts of data. This has recently raised various philosophical debates, calling to re-examine the well-functioning of our epistemic practices. However, the question that underlies this symposium is whether size really matters? Are there specific risks and harms pertaining to large scientific research? Further, what is the impact of power relations, struggle for prestige, and academic precarity on the design and implementation of large-scale experiments? To what extent does the dynamics of scientific research contribute to various forms of injustices and exploitation? We contend that feminist, decolonial, and environmental perspectives are essential to address these challenges.We invite contributions dealing with epistemic risk and epistemic injustices in the context of large-scale scientific research. The notion of epistemic risk is understood in a broad sense, to cover a variety of approaches from general philosophy of sciences, decision-theory, and social epistemology. Proposals building on case-studies from any scientific field are welcome.

Topics for contribution may include but are not limited to:

- collaborative production of scientific knowledge
- implementing values in big science technologies
- the division of cognitive labor and distributive (in)justice
- social diversity and discriminatory harm in collaborative research
- pathways into feminist and decolonial physics
- large experiments and sustainable science

The symposium aspires to explore a wide range of approaches at the intersection of epistemological, social, and ethical concerns. We envision this event as an opportunity to exchange ideas coming from diverse perspectives and to bring together researchers which share common interest in the potential perils of ever bigger science.

Invited Speaker: Hannah Rubin (University of Notre Dame)

Symposium - Large-Scale Experiments vs. Large-Scale Observations

Organized by Florian Boge and Michael Stöltzner

The distinction between observational and experimental science has become difficult to pin down in

contemporary science. The symposium will shed new light on this distinction by investigating large scale scientific enterprises such as particle physics that are standardly considered experimental and other large-scale scientific enterprises such as climate research and astronomy that are standardly considered observational. Topics discussed include the following:

- What are the key differences and commonalities between experiment and observation in data taking? Are there fundamental differences that support the dichotomy, such as the amount of guidance by theory or the systematicity of the data-taking procedures?
- What are the key differences and commonalities in analysis? For instance, are similar statistical, simulation, and machine learning techniques used in big experiments and observations, or do they differ fundamentally?
- What, if anything, are the key epistemic lessons to be distilled from these differences? Are experiments in some sense epistemically preferable? Or are observations? Or does this vary with context?

Invited Speaker: Claus Beisbart (University of Bern)

Symposium - Creativity and Constraints in Large-Scale Collaboration

Organized by Daria Jadreškić and Helene Sorgner

Across the sciences, we observe an increase in the number and size of research collaborations – between groups, laboratories, institutions; across countries and disciplines. In the collective pursuit of a shared scientific goal, the modes, scale, and intensity of collaboration may vary, from the collective funding, design, construction and operation of experiments and their supporting infrastructures, to the collective analysis, authorship and publication of results. These different modes of collaboration in turn may foster specific research practices and types of innovation while constraining others, as they require coordination and compromises between individual members, groups, and institutions.

Considering that creativity is traditionally both considered a prerequisite of scientific innovation and ascribed to individuals and their ideas, we ask how creativity emerges in different collaborative environments, how collaborations foster or impede creativity, and how this relates to the specific constraints that large-scale collaborations pose on scientific practice. Who is the subject of creative ideas in a research collective, and what makes ideas creative? How do organizational practices, the centralization and standardization of instruments and methods, or the adherence to procedural guidelines affect creativity in collaborations? On the other hand, how can collaborations actively sustain and foster creativity? Are there tensions between individual and collaborative creativity, or between other kinds of creativity? How are they resolved?

This symposium invites contributions from social studies of science, philosophy, and history of science that tackle these and other questions exploring different notions of creativity and constraints at work in large-scale collaborations across the sciences.

Symposium - Theoretical Expectations and Large Experiments

Organized by Radin Dardashti, Robert Harlander and James Fraser

This symposium explores the role of theoretical expectations in the justification, design, and development of large experiments such as the Large Hadron Collider (LHC), the Laser

Interferometer Gravitational-Wave Observer (LIGO), and the Event Horizon Telescope (EHT) or similar efforts in other fields of science. We shall address questions such as

- What kinds of theoretical considerations motivate large experiments (e.g. fundamental principles, theoretical virtues, specific theories or models)?
- Do theoretical expectations for potential findings at large experiments have particularly solid foundations, given that such experiments require large amounts of funding?
- Is there space for exploratory modes of experimentation in large experiments; that is, modes in which there are no strong theoretical expectations for discovery?
- To what extent are large experiments flexible with respect to new theoretical developments?
- Do large experiments have the potential to surprise us? And could such potential contribute to the justification of large experiments?

Symposium - Big Science and Democracy - Climate Engineering and Experiments Affecting Very Large Systems

Organized by Sophia Haude

Large-scale experiments in many cases have strong implications for even larger complex systems. This is especially evident in the field of climate engineering which usually deals with experiments that affect the whole globe or large parts of it. Many of them are therefore highly controversial. By now, the IPCC is in consensus that the climate crisis can no longer be brought under control without climate engineering interventions like solar radiation management or carbon dioxide removal. However, in spite of the great opportunities that many of these interventions seem to pose, their risks and side effects cannot be foreseen without understanding very complex systematic interrelationships, making the interventions themselves extremely large experiments.

While structural societal challenges become more complex specialization in the sciences progresses. Thus, many policy decisions are being made whose implications no single individual can completely oversee. This gives rise to manifold questions concerning the relationship between science and politics, including: What roles should experts and laypersons play in policy making? What roles do trust and economic or social interests play in politics and science? (How) can systemic problem solving be achieved through accumulated specialized expertise? Which administrative and governmental structures are most likely to meet these challenges?

In this symposium, we would like to address questions like these in the context of experiments affecting large systems like the above mentioned. We welcome contributions from the intersection of the two fields of "Science and Democracy" and "Climate Engineering", but also explicitly contributions from only one of the two fields given interest in exchanges about the connection of the two. The symposium is expected to consist of three to four invited or contributed talks, as well as a panel session among the presenters involving the audience.

Symposium - Histories of Large Experiments and their Methodological Challenges

Organized by R. Harlander, J.P. Martinez, F. Steinle and A. Wüthrich

Large experiments pose several specific challenges to historical studies. For one, the amount of potentially relevant sources and information tends to grow proportionally with the “size” of an experiment (in terms of the number of scientists involved, budget, spatial extension etc.). Also,

large experiments tend to be much longer in the making and run over longer periods of time than experiments of smaller size. In addition, the historical studies of large experiments may require specific historiographical concepts such as collective authorship. For these reasons, historians often need suitable selection criteria to arrive at a manageable amount of sources and a particularly sharp sense for the shifting historical context over the duration of the experiment and for the idiosyncracies of scientific collaborations. The first challenge may, in part, be met by employing “distant reading” and other digital tools. Also, oral history may guide the historian to the most relevant sources thanks to the actors’ insider knowledge. But for many historical questions, close reading will still be required to supplement digital methods. Also, the information from oral history may turn out to be misleading, due to a possibly biased perspective of the involved actors. For this symposium, we invite proposals which identify particular methodological challenges for histories of large experiments, and how to deal with them (digitally, by oral history, or otherwise). The contributions ideally combine concrete case studies with more abstract methodological reflections, but may also focus on one or the other.

Invited Speaker: Elena Aronova (University of California Santa Barbara)

Contributed Papers

Contributions to the conference which are not fitting any of the Symposia topics.