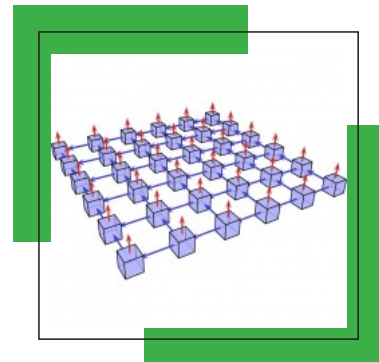


# Tensor Methods and Emerging Applications to the Physical and Data Sciences

March 8 - June 11, 2021



## Scientific Overview

Linear algebra is an essential tool in mathematics, science, and engineering, as almost all natural processes are linear in small increments. The most natural generalization of linear algebra is multilinear algebra where matrices are replaced by tensors. It describes natural phenomena where the variation is linear if we keep all but one factor constant. Furthermore, tensors and multilinear algebra emerge from discretization of multivariate functions – one can simply view the grid values as coefficients of a multivariate tensor.

While exciting results have emerged from various research communities, there has not been much exchange and collaboration between theoreticians and developers of practical algorithms. The aim of this long term program is to bring together experts and junior participants from different fields and experiences, to exchange ideas, tackle challenges, collaborate, and advances the general field of tensor methods. We foresee this program to be a milestone platform for the future development of the research area and to have a long standing impact.

## Long Program Schedule

- Opening Day. March 8, 2021.
- Tensor Methods and Emerging Applications to the Physical and Data Sciences Tutorials. March 9-12, 2021.
- Workshop I: Tensor Methods and their Applications in the Physical and Data Sciences. March 29-April 2, 2021.
- Workshop II: Tensor Network States and Applications. April 19-23, 2021.
- Workshop III: Mathematical Foundations and Algorithms for Tensor Computations. May 3-7, 2021.
- Workshop IV: Efficient Tensor Representations for Learning and Computational Complexity. May 17-21, 2021.
- Culminating Workshop at Lake Arrowhead. June 6-11, 2021.

## Organizers

Thomas Barthel (Duke); Victor Batista (Yale); Fernando Brandao (Caltech); Gero Friesecke (TU München); Lek-Heng Lim (Univ. of Chicago); Jianfeng Lu (Duke); Elina Robeva (MIT); Ming Yuan (Columbia)

## Participation

This long program will involve senior and junior researchers from several communities relevant to this program. You may apply for financial support to participate in the entire fourteen-week program, or a portion of it. We prefer participants who stay for the entire program. Applications will be accepted through **November 30, 2020**, but offers may be made up to one year before the start date. We urge you to apply early. Mathematicians and scientists at all levels who are interested in this area of research are encouraged to apply for funding. Supporting the careers of women and minority researchers is an important component of IPAM's mission and we welcome their applications. More information and an application is available online.

