## INFORMATION AND COMMUNICATION COMPLEXITY
### by Mark Braverman, Rotem Oshman and Omri Weinstein

"Can interactive conversations be compressed?"

**Information complexity is the extension of classical information theory to the interactive setting.** While classical information theory mainly concerns one-way transmission, information complexity studies the scenario where communication goes back-and-forth. The interactive setting has many applications in computer science, including data structures, streaming, privacy, circuit complexity and distributed computing; it has received great interest from the theoretical computer science community in recent years.

In contrast to classic one-way information theory which focuses on the asymptotic transmission rate as the number of copies sent goes to infinity, many of the applications of information complexity require understanding the "one-shot" version, where we have just a single copy. It is well-known that for one-way transmission the asymptotic and one-shot communication costs are nearly equal (Shannon, Huffman), but for interactive communication this turns out to be false (Ganor, Kol and Raz'14).

The quest for optimal interactive compression is far from being complete, but several weaker compression schemes are known, and they will be the focus of this tutorial. We will survey the basics of interactive information complexity, discuss some exciting recent progress, and point out major open problems in this emerging field of research.

**About the speakers:** Mark Braverman (Princeton), Rotem Oshman (Tel-Aviv) and Omri Weinstein (Princeton) have done fundamental research in the area of information complexity and its applications, with over fifteen published papers on this new topic in top CS conferences. This tutorial is based on monographs recently written by the authors, including a survey by Braverman on interactive information and coding theory (invited to the 2014 International Congress of Mathematicians, ICM'14), a 2015 mini-course given by Oshman at the 2015 Barbados Workshop on Computational Complexity, and an upcoming guest column by Weinstein on interactive compression, which will appear in the next issue of the ACM SIGACT News.



Mark Braverman



Rotem Oshman



Omri Weinstein