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Spring 2023 Colloquium

Department of Computer and Information Sciences

Pseudorandomness and Space Complexity: New Methods, New Insights, and New Milestones

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Tuesday, March 28, 2 PM
Room: SERC 306

Abstract: Algorithm designers often introduce random choices into their algorithms in an effort to improve efficiency. However, random bits cannot necessarily be produced for free, so deterministic algorithms are preferable to randomized algorithms, all else being equal. Is randomness ever truly necessary for efficient computation? What, ultimately, is the role of randomness in computing?

In this talk, I will discuss the "L = BPL" conjecture, which says that for every clever randomized algorithm, there is an even cleverer deterministic algorithm that does the same job with roughly the same *space complexity.* The most traditional approach for trying to prove this conjecture is based on pseudorandom generators (PRGs), which have additional applications beyond derandomizing algorithms. There are also other approaches based on variants of the PRG concept, most notably "weighted PRGs" and "hitting set generators." I will give an overview of my contributions in this area (with collaborators), consisting of new constructions and applications of these three types of generators.

Bio: William Hoza is a postdoctoral fellow at the University of California, Berkeley through the Simons Institute for the Theory of Computing. His PhD is from the University of Texas at Austin, where he was advised by David Zuckerman. He studies topics in computational complexity theory, especially pseudorandomness and derandomization.