



THE CATHOLIC UNIVERSITY OF AMERICA

Department of Electrical Engineering and Computer Science

Spring 2023 Seminar



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

Tuesday, January 31th, 2023

11:15 AM – 12:30 PM, Scullen Room

(All are welcome to attend)

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.