Colloquium in Mathematics

Title: ASSOCIATIVITY FROM KINDERGARTEN ON
Speaker: Jim Stasheff (Univ of North Carolina at Chapel Hill and Univ of Pennsylvania)
Time: 1:00 pm - 1:50 pm on Thursday (11/12/20)
Zoom Meeting ID: 912 0840 7379 (Passcode: Colloquium)

Abstract:
Quoting Einstein:
Concepts which have proved useful for ordering things easily assume so great an authority over us, that we . . . accept them as unalterable facts.

Such is the case with the associative law. It was Yuri Rainich (one of Einstein's mathematical correspondents) who revealed to me as an undergraduate that associativity was optional. As a grad student, I pursued the option of homotopy associativity and its coherent higher homotopies. There are good graphic representations in terms of polyhedra, known as *associahedra*. The same objects had occurred earlier in combinatorial geometry, the edges forming the *Tamari lattice*. Later they appeared in group theory lattices, iterated tensor products of representations and even in mathematical physics. In the latter, an even more prominent role is played in terms of the analogous higher homotopy Jacobi conditions.

About Speaker: Jim Stasheff has made significant contributions to algebra, homotopy theory, differential topology, and mathematical physics. A graduate of University of Michigan, Princeton University, and Oxford University (with two doctoral degrees), he held positions at MIT, Notre Dame, Princeton, Temple University, UNC, and UPenn. He is an emeritus faculty member of UNC and a longtime visiting professor at UPenn, where he has worked with Murray Gerstenhaber, another extraordinary mathematician. Jim, as he is known to hundreds of mathematicians who have been in his orbit, has authored/co-authored countless influential papers and books. Among these are Characteristic Classes (with John Milnor, 1984) and "Homotopy Associativity of H-Spaces I and II" (Transactions of the AMS, 1963), where he introduced the objects now known as the Stasheff polytopes or associahedra (which he will talk about). The topics that he pioneered and/or expanded include $A\infty$-algebras, other higher homotopy structures (operads, Poisson algebras,...), and cohomological physics. Suggested reading:
1. Wikipedia article https://en.wikipedia.org/wiki/Jim_Stasheff#CITEREFMilnorStasheff1974
2. "An Appreciation of the Work of Jim Stasheff" by John McCleary (in Higher Homotopy Structures in Topology and Mathematical Physics—Proceedings of a Conference to honor Jim Stasheff's sixtieth birthday, doi:10.1090/conm/227/03260)
3. "Origins and the Breadth of the Theory of Higher Homotopies" by J. Huebschmann, https://arxiv.org/pdf/0710.2645.pdf
4. "L^∞ and A^∞ algebras: then and now" by Jim Stasheff, https://arxiv.org/pdf/1809.02526.pdf

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