DEPARTMENT OF MATHEMATICS & STATISTICS

UNIVERSITY OF WYOMING

Thursday
November 2nd, 2023- 4:10-5:00 pm
Location: AG 1032
Reception at 3:30 pm in RH 261

Irina Holmes Fay

Texas A&M University

On some recent developments and future directions in dyadic harmonic analysis

Abstract:
Ever since Stefanie Petermichl proved the so-called "A2 conjecture" using dyadic methods (a feat which earned her the Salem Prize in 2006), there has been a lot of interest in dyadic harmonic analysis. At its core, her proof relied on an ingenious representation of the Hilbert transform as a probabilistic average of dyadic operators (think step functions). This was an entirely new way to look at the Hilbert transform - one of the most studied objects in analysis since the early 1900's! Something of this nature occurs very rarely, so it is perhaps not that surprising that it laid the foundation for a whole new area of harmonic analysis. Most objects of interest in classical harmonic analysis (BMO, square function operators, maximal functions, singular integral operators etc) now have not only dyadic analogues, but also established methods to easily recover sharp bounds from these dyadic analogues and their bounds. In turn, these dyadic operator bounds are much easier to obtain, largely because of the convenient geometrical properties of dyadic grids. One can also interpret these geometrical properties as martingale properties - this stochastic point of view, inspired by Burkholder's work on the martingale transform, leads to the Bellman function method developed by Nazarov, Treil and Volberg in the late 90's. The very successful "sparse domination" method has emerged relatively recently in the field, but has already been developed extensively by many. We will discuss some of these aspects and recent results involving weighted bounds for paraproduct operators.