**ACO Seminar**

**Nov. 4**, 3:30pm, Wean 8220

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**Diamond-free Families**

**Abstract:**

Given a finite poset $P$, we consider the largest size $\mathrm{La}(n,P)$ of a family of subsets of $[n] := \{1,\ldots,n\}$ that contains no subposet $P$. Sperner's Theorem (1928) gives that $\mathrm{La}(n,P_2) = \binom{n}{\lfloor n/2 \rfloor}$, where $P_2$ is the two-element chain. This problem has been studied intensively in recent years, and it is conjectured that $\pi(P) := \lim_{n\to\infty} \mathrm{La}(n,P)/\binom{n}{\lfloor n/2 \rfloor}$ exists for general posets $P$, and, moreover, it is an integer. For $k \geq 2$ let $D_k$ denote the $k$-diamond poset $\{A < B_1,\ldots,B_k < C\}$. We study the average number of times a random full chain meets a $P$-free family, called the Lubell function, and use it for $P = D_k$ to determine $\pi(D_k)$ for infinitely many values $k$. A stubborn open problem is to show that $\pi(D_2) = 2$; here we prove $\pi(D_2) < 2.273$ (if it exists).

Joint work with Wei-Tian Li, and Linyuan Lu