

# BI-CO MATHEMATICS COLLOQUIUM

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## ***“Positivity properties for orthogonal sets in lattices”***

***Monday, April 22, 2024***

*Talk at 4:15 - Hilles 109*

*Tea at 4:00 – Foyer outside of Hilles 109*

### **Abstract:**

There is an extremely dense way to pack spheres in 8-dimensional Euclidean space in such a way that each sphere touches 240 others. The centers of these spheres form a discrete structure called the  $E_8$  lattice, and the 240 nonzero vectors of minimal norm in the lattice are known as roots. This talk will explain how orthogonal bases of such roots can themselves be regarded as the elements of a discrete structure in a different vector space. We will also discuss the mysterious appearance of certain positive integers in this context, as well as analogous phenomena in other lattices.

(This talk is based on joint work with Tianyuan Xu.)