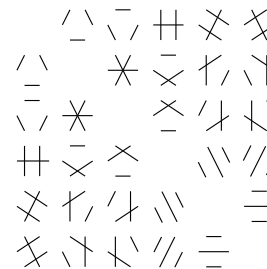


# Mathematics Seminar



## Rocky Mountain Algebraic Combinatorics Seminar

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### Doubly transitive lines

Joseph Iverson  
Iowa State University

A basic problem in discrete geometry asks to arrange lines through the origin of a given vector space without creating sharp angles. A line packing is called optimal when the sharpest angle is made as large as possible. Many of the known optimal packings display extraordinary symmetry, as with lines connecting antipodal vertices of a 20-sided die. This talk focuses on a special case of this phenomenon: doubly transitive lines. Such lines are not only equiangular, but also optimally packed in projective space. Moreover, every sequence of doubly transitive lines naturally carries a special type of association scheme. By leveraging this fact, we provide a partial classification of doubly transitive lines, namely those with almost simple symmetries.

This is joint work with Dustin Mixon.

### Harmonic equiangular tight frames and their combinatorial generalizations

John Jasper  
South Dakota State University

It is a well established phenomenon that optimal packings of points in metric spaces often exhibit large amounts of symmetry. One of the richest classes of optimal packings, the so-called equiangular tight frames (ETFs), are no exception. Indeed, a large family of ETFs known as harmonic ETFs arise as the orbit of a single vector under the action of some abelian group. However, when we look closely at these harmonic ETFs we often observe that the group that seems to be calling the shots can actually be replaced by a more common combinatorial object. In this talk we will see a couple of instances of this generalization from algebra to combinatorics and how these generalizations greatly enrich the theory of ETFs.

Weber 201  
4–6 pm, Friday, Feb 28, 2019  
(Refreshments in Weber 117, 3:30–4 pm)  
Colorado State University

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This is a joint Denver U / UC Boulder / UC Denver / U of Wyoming / CSU seminar that meets biweekly.  
Anyone interested is welcome to join us at a local restaurant for dinner after the talks.



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