

*Texas State University
Department of Mathematics Colloquium
Friday, March 5, 2021
3:30pm on Zoom*

Billiards in Orthoschemes



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Abstract: The orthoscheme $O(a,b,c)$ is the tetrahedron whose vertices are $(0,0,0)$, $(a,0,0)$, $(a,b,0)$ and (a,b,c) . These tetrahedra are the building blocks for 3-dimensional scissors congruence, but I am going to play billiards in them. They make an attractive family for billiards because, like triangles, they are controlled by 3 parameters and up to scaling there are just two parameters. I will demonstrate a program I wrote which hunts for periodic billiard paths in orthoschemes. The program turns up some surprising phenomena. I will also explain connections to group cohomology, elementary number theory, and the large scale geometry of some symbolic sequences.

Rich Schwartz received his PhD in mathematics from Princeton University in 1991 under the supervision of William Thurston. He has taught at the University of Maryland and is currently the Chancellor's Professor of Mathematics at Brown University. He is the best-selling author of the children's picture book "You Can Count On Monsters," a Guggenheim Fellow (2003), a Clay Research Scholar (2009), and a Fellow of the American Mathematical Society (2017). His book, "Really Big Numbers," was an inaugural winner of the 2015 MSRI Mathical: Books for Kids from Tots to Teens Award for both Grades 3-5 and Grades 6-8.