

Topology, Arithmetic, & Dynamics Seminar

Algebraic Vision: the Quadrifocal Variety

Luke Oeding

Department of Mathematics and Statistics
Auburn University

In Computer Vision and especially the subfield of Multiview Geometry many interesting algebraic varieties arise naturally. I will focus on one of them: the quadrifocal variety.

The quadrifocal variety is a 39-dimensional algebraic subvariety of the 80-dimensional projective space of 3 by 3 by 3 by 3 tensors.

I will discuss how to use symmetry to study the ideal of polynomial equations vanishing on the quadrifocal variety. Despite being of high dimension and codimension, it is still possible to compute its ideal up to degree 8 using classical invariant theory and modern computing. I will explain these symmetry-enhanced massively parallel computations and their distributed implementation in Maple.

Further analysis using Macaulay2 (and the package "SchurRings") allows us to rule out certain syzygies, giving a lower bound for the number of minimal generators. Led by these computations we ask if the ideal of the quadrifocal variety could be minimally generated in degree at most 9.

Date: **Friday, March 18, 2016**

Time: **2:30-3:30pm**

Place: **4106 Exploratory Hall**

For special accommodations, please contact Sean Lawton via email at slawton3@gmu.edu.