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Recent developments in rationality of cubic fourfolds

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Abstract: Which cubic hypersurfaces in P^5 are rational? Certainly some, but conjecturally not all. The problem has classical roots, but it has seemed tractable since the 70s, when Clemens and Griffiths gave a beautiful solution to the analogous problem for cubic threefolds using Hodge theory. Hassett worked on adapting their argument to cubic fourfolds in the late 90s; Kuznetsov tried again around 2008, using derived categories in place of Hodge theory; Galkin and Shinder have gotten further this year using the Grothendieck ring of varieties. While none of these attempts has succeeded at solving the problem, each has brought new insights. My own contribution has been to explain how these three would-be rationality criteria are interrelated. In the course of the talk I'll pose an elementary number theory puzzle that might get a student a paper.

Tuesday, October 7, 2014, 4:00 pm
Mathematics and Science Center: W306

MATHEMATICS AND COMPUTER SCIENCE
EMORY UNIVERSITY