CCSU

DEPARTMENT OF MATHEMATICAL SCIENCES
MATH CLUB AT CCSU

COLLOQUIUM

Thursday, September 17
12:30 – 1:30 PM
Maria Sanford, Room 323

REGULAR POLYHEDRA AND SIMPLE GROUPS

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Abstract: In two dimensions there are regular polygons with any number of sides bigger than two, and all of them are pretty easy to understand. In three dimensions, Euclid showed that there are regular polyhedra having 4, 6, 8, 12, or 20 sides: no other numbers are possible. In the 19th century, Felix Klein rephrased Euclid's classification as a statement about the possible groups of two by two matrices.

Building on Klein's work, John McKay about twenty years ago related regular polyhedra to "harmonic graphs." Here's a picture of the graph for the regular icosahedron.

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                    3
                    |
1 – 2 – 3 – 4 – 5 – 6 – 4 – 2
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Each of the vertex numbers is one half the sum of the adjacent numbers. I'll explain McKay's recipe relating regular polyhedra to harmonic graphs.

The miracle is that these graphs--coming from a very special and classical geometry problem--turn out to be exactly the "Dynkin diagrams" that arise in the classification of simple groups. Exactly why this should be true is still something of a mystery.

For further information:

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