

1145-AE-668

**Larry G Rolan\*** ([larry.rolan@vanderbilt.edu](mailto:larry.rolan@vanderbilt.edu)), Department of Mathematics, 1420 Stevenson Center, Vanderbilt University, Nashville, TN 37240. *Congruent numbers and modular local polynomials.*

There are many right triangles with integer side lengths, like the well-known triangles with side lengths 3-4-5 or 5-12-13; examples of *Pythagorean triples*. It has been known since the ancient Greeks how to write down all such Pythagorean triples in a beautiful manner. The famous congruent number problem modifies this question slightly, and simply asks for a given integer  $n$ , whether there are any right triangles with *rational* side lengths and area  $n$ . This problem turns out to be much more subtle, and a simple criterion for which  $n$  are “congruent” remained out of reach for centuries until a celebrated result of Tunnell in the 1980’s.

In this talk, I will discuss recent joint work with Stephan Ehlen, Pavel Guerzhoy, and Ben Kane, where we study so-called *locally harmonic Maass forms* and their applications to congruent numbers and related objects. We will also review famous modern results on this classical problem such as Tunnell’s Criterion which gives a fast procedure for checking whether any number should be congruent, and their connections to big ideas in number theory and the \$1 Million Birch and Swinnerton-Dyer conjecture. (Received September 12, 2018)