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Paul Bruillard, César Galindo, Seung-Moon Hong, Julia Yael Plavnik*
(plavnik@famaf.unc.edu.ar), **Eric C. Rowell** and **Michael Sun**. *On strictly weakly integral modular categories of rank 8 and 9*. Preliminary report.

Modular categories are algebraic objects that appear in several mathematical areas, such as topological quantum field theories, conformal field theory, quantum groups, subfactor theory, quantum computing and others. A modular category is a non-degenerated ribbon fusion category over the complex numbers. Fusion categories are rigid semisimple tensor categories with only finite isomorphism classes of simple objects. The number of isomorphism classes of simple objects is called the rank of the fusion category.

In this talk, we will discuss some approaches to classifying modular categories by rank and we will recall some of the known results. We will also present some results of our current work and some ideas of the proofs. The main theorem is the following.

Theorem: There are no strictly weakly integral modular categories of rank 8.

At the moment, we have the conjecture that strictly weakly integral modular categories of rank 9 are Grothendieck equivalent, which means that they have the same fusion rules, to Ising \boxtimes Ising, Ising \boxtimes Rep($\mathbb{Z}/2\mathbb{Z}$) or SO(11)₋₂. We have achieved some positive results and there is only one remaining case. (Received September 15, 2014)