CCSU

DEPARTMENT OF MATHEMATICAL SCIENCES

COLLOQUIUM

Friday, October 13
3:15 – 4:15 PM
Maria Sanford, Room 101

ABOVE AND BELOW THE NUMBERS WE KNOW – EXPLORING THE SURREAL NUMBERS pt.1

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Abstract: Georg Cantor and John von Neumann paved the way for modern Set Theory and refined the Principle of Transfinite Induction. Cantor's work prompted David Hilbert's famous proclamation, "No one shall expel us from the paradise that Cantor has created for us." But what if there is a greater paradise just beyond the horizon? While trying to understand the complex system of moves found in the board game Go, John Horton Conway discovered an interesting mathematical structure that became the foundation of the Surreal Numbers. The Surreal Numbers form a field whose domain is a proper Class, containing the finite, infinite, and infinitesimal ordinal numbers. In this talk, the construction of the Surreal Numbers and the foundation of this Field will be introduced and complemented by the work of Donald Knuth [*Surreal Numbers*, 1974], selections from Abraham Robinson's [*Non-Standard Analysis,* 1966] regarding rules for extending standard number systems, as well as an excerpt from John L. Bell's work about the logical costs of including infinitesimals [*A Primer on Infinitesimal Analysis,* 2008]. I will discuss several key issues that must be addressed when using the Surreal Numbers, and finish by exploring potential areas of mathematics that could benefit from a rigorous foundation for Surreal Analysis. This presentation assumes a conceptual understanding of numbers, cardinality, ordinality, infinity, and set theory, however, detailed knowledge of these topics is not required.

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