SEMINAR IN PHYSICS

FRIDAY, FEBRUARY 28

3:30-4:25 – ROSS 0220

REFRESHMENTS

Implications of the Recent Synthetic Magnetic Monopole Creation

James Harris (UNC Physics student)

At the end of January this year a team of researchers led by Dr. David Hall from Amherst College were able to create synthetic magnetic monopoles in the lab. Eighty years ago Paul Dirac predicted the existence of these monopoles through careful manipulation of the quantum mechanical principles behind Maxwell's equations, despite the fact that one of these equations states that the Magnetic Flux at every point in space is zero. Interestingly enough, this prediction asserted that the quantization of electric charge is a result of the existence of magnetic monopoles and that the existence of a magnetic monopole would make Maxwell's equations beautifully symmetric.

This symmetry generalizes to some pretty fascinating ideas in modern theoretical physics. However, in the decades that followed, the search for these magnetic monopoles has returned no conclusive physical evidence of their existence. In this discussion we will look at what a magnetic monopole is, the contradictions within Maxwell's equations and Dirac's solution, the implications of this solution on modern theoretical physics, the method used by Dr. Hall's team to create a synthetic monopole, and what this could mean for the future.

Testing General Relativity Using Pulsars

Kyle Nachbar (UNC Physics student)

Since its proposal in 1915, Albert Einstein's theory of general relativity has been heavily scrutinized and has persevered through every experiment trying to disprove it. But new technologies and experimental methods will put Einstein's greatest theory to the test. Astronomers have discovered the first pulsar with two stars orbiting it, making it an ideal situation to test the "strong equivalence principle", one of the key predictions of general relativity.