

# This Week in Physics

SYRACUSE UNIVERSITY  
*College of Arts & Sciences*

Week of  
April 7, 2008

[http://www.phy.syr.edu/  
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## TUESDAY, APRIL 8

Colloquium

4:00 PM, Rm 202 (refreshments 3:30 PM, Rm 204)

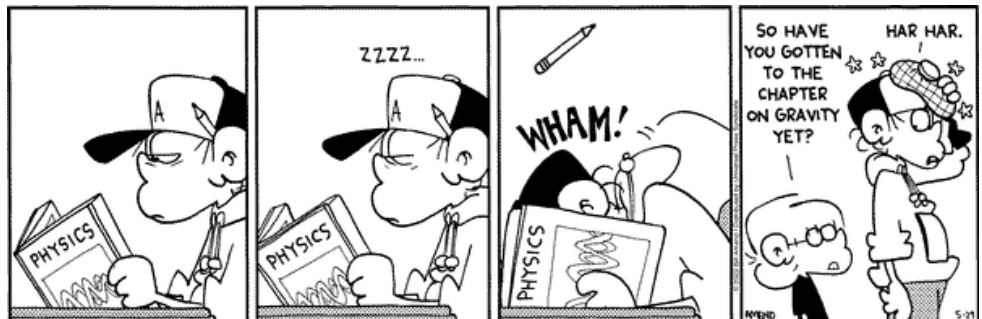
**Dr. Constantinos Skordis (Perimeter Institute)**

*Gravity at the edge of the universe*

Gravity is the oldest force known, yet the least understood. It is the only known force that remains effective at very large distances. Newtonian gravity and its successor General Relativity are in excellent agreement with experiment in our solar neighborhood. But if we extrapolate them to large distances, they fail miserably to explain observations if matter in the universe is of the same form as what we have so far detected on Earth.

There are two possible explanations: either there is more unseen matter which has yet to be detected in the lab, or we need to reexamine and extend our theory of gravity. After reviewing the main observations that illustrate the problem, I further discuss the second possibility. I first consider a simple proposal by Milgrom to modify Newtonian gravity. I then show how a relativistic extension of this theory surprisingly explains the formation of structure in a regime it was not designed for.

Finally I discuss further and simpler possibilities and argue that this could be a good time to develop tests of gravity on cosmological scales.



## WEDNESDAY APRIL 9

Joint Cosmology/High Energy Physics Seminar  
12:45 PM, Rm 202

Dr. Constantinos Skordis (Perimeter Institute, Waterloo, Ontario)

*Conundrums and prospects of modified gravity*

Condensed Matter/Biological Physics Seminar  
2:00 PM, Rm 202

Prof. Wolfgang Losert (University of Maryland)

*Decision making in D. discoideum*

## THURSDAY, APRIL 10

Colloquium

4:00 PM, Rm 202 (refreshments 3:30 PM, Rm 204)

Prof. Myriam Sarachik (CCNY)

*Molecular Nanomagnets*

Molecular magnets, sometimes referred to as single molecule magnets, are organic crystals containing a very large (Avogadro's) number of magnetic molecules that are nominally identical, providing ideal laboratories for the study of nanoscale magnetic phenomena. With molecular clusters of large total spin (10 or higher), their behavior straddles the border between classical and quantum magnetism. The molecules are magnetically bistable at low temperatures, exhibit macroscopic quantum tunneling between up- and down-spin orientations, and demonstrate quantum interference between tunneling paths. Interest in these materials has grown dramatically in the last several years, owing to their potential use for high-density information storage, as well as the possibility that they could provide the qubits needed for quantum computation. Typical behavior of the class will be examined by considering Mn<sub>12</sub>-acetate, a particularly simple prototype. The talk will end with a brief description of our recent discovery of magnetic deflagration, a phenomenon closely analogous to the propagation of a flame front through a flammable chemical substance.

## FRIDAY, APRIL 11

Joint Cosmology/High Energy Physics Seminar  
12:15 PM, Rm 202

Prof. Alexios Polychronakos (City Coll. of N. Y.)

*TBA*