



U N I V E R S I T Y O F  
**SOUTH CAROLINA**

**DEPARTMENT OF  
PHYSICS AND ASTRONOMY  
COLLOQUIUM**

*Speaker:*

**Dr. Frank T. Avignone, III  
Department of Physics and Astronomy  
University of South Carolina**

*Title:*

**“Search for Lepton Number Violation and Neutrino Mass with Nuclear  
Double-Beta Decay”**

*Abstract:*

The neutrino is the most prolific elementary particle in nature, yet we know less about it than all of the other particles that form the basic building blocks of the standard model of elementary particle physics. Neutrinoless double-beta decay is the only practical experiment to determine if neutrinos are Majorana particles (their own anti-particles). If this exotic decay mode would be observed, and its decay rate measured, we would know that neutrinos indeed are Majorana particles, and the decay rate would determine the values of the neutrino mass eigenstates. The USC Particle Astroparticle Group has been involved in two major double-beta decay experiments, CUORE, in Italy, and Majorana, an experiment being developed for the new U.S. deep underground science laboratory (DUSL) proposed by the National Science Foundation. Four USC graduate students are presently involved in these experiments. The basic neutrino physics, the status of experimental results, the experiments CUORE and Majorana, and their potential physics impact of these experiments will be discussed.

**Jones Physical Science Center  
Rogers Room  
PSC 409**

**Thursday, October 4, 2007  
3:30 pm**

**Refreshments at 3:15 pm**

**Everyone invited**

**Hosted by: Sanjib R. Mishra**