College of Science
Department of Physics & Astronomy

WEEKLY CALENDAR

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WEEKLY CALENDAR

March 18 - 22, 2013

DEPARTMENTAL COLLOQUIUM

"Solution to the Supernova Progenitor Problem"

3:30 PM March 21, 2013
109 Nicholson Hall

Bradley Schaefer
LSU, Department of Physics & Astronomy

Host: Juhan Frank

• Refreshments served at 3:10 PM in 232 (Library) Nicholson Hall •

It is strongly known that thermonuclear supernovae (i.e., "Type Ia") result from the explosion of a carbon/oxygen white dwarf, but what is ***not*** known is what type of star system can do this. This is a four-decade-long problem, with proposed solutions including close double white dwarf binaries in-spiraling, recurrent novae with mass being fed to the white dwarf until the Chandrasekhar mass is reached, symbiotic stars, and helium stars. With the advent of supernovae as the premier tool of cosmology, this progenitor problem has reached yet higher heights of importance, as the identity of the progenitor will determine the evolution of supernovae as standard candles and hence subtly change the expansion history of the Universe and then what we know about the properties of Dark Energy. I claim that my new results have solved this progenitor problem. First, the utter lack of any ex-companion star in the remnant SNR0509-67.5 shows that this one event was certainly from a pair of inspiralling white dwarfs. Second, I have measured the period change across three recent recurrent nova eruptions (an enterprise I started in 1987 that has used >500 nights of telescope time) to prove that their white dwarfs eject more mass than they accrete, so they are certainly not progenitors. Third, I find that half of the recurrent novae have oxygen/neon/magnesium white dwarfs and hence cannot be progenitors. Fourth, I collect evidence from a wide array of experiments from around the world to show that ~400 Type Ia supernova do ***not*** have any companion stars that are above the main sequence, and this rules out most of the models involving a single white dwarf. We are left with the only model being the two-inspiralling-white-dwarfs."