2006 APS April Meeting

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Sunday, April 23, 2006 8:30AM - 10:18AM –
Session H5 COM: Discovery Prospects at the Energy Frontier Hyatt Regency Dallas Pegasus B

8:30AM H5.00001 The Coming Revolution in Particle Physics OLIVER BAKER, Hampton University and Jefferson Lab — Mysteries about the composition of our universe at its most fundamental level are fueling a revolution in particle physics. The nature of dark matter and dark energy, the disparity in gauge boson masses, the absence of primordial antimatter, and other observations make for an exciting period of likely discovery in the field. The physics program at the Large Hadron Collider (LHC) is one of the most likely venues for new discoveries that may shed light on these and other phenomena. I will present an overview of the ATLAS experiment at the LHC and highlight a few examples of profoundly new views of the character of space and time that are predicted to reveal themselves in the early running period.

9:06AM H5.00002 Discovery prospects at the Large Hadron Collider , KETEVI ASSAMAGAN, Brookhaven National Laboratory — The physics program at the LHC includes precision tests of the Standard Model (SM), the search for the SM Higgs boson, the search for the MSSM Higgs bosons, the search for Super Symmetry, sensitivity to alternative scenarios such as compositeness, large extra dimensions, etc. This requires general purpose detectors with excellent performance. ATLAS and CMS are general purpose detectors under construction for the Large Hadron Collider (LHC). Data taking is expected to start in April 2007. The detector performance and the prospects for discoveries are studied in various physics and detector performance working groups. In this talk, we will review the discovery prospects of the LHC.

9:42AM H5.00003 Testing the top quark lifetime , AYANA HOLLOWAY, Harvard University — Experiments at the Fermilab Tevatron are collecting large and exceptionally pure samples of top quarks, and performing measurements to confirm that the particle discovered in $p\bar{p}$ collisions a decade ago is the anticipated sixth quark. One unambiguous test is a measurement of the top quark lifetime, which is constrained by the consistency of the Standard Model to be less than 10^{-24} s. I will describe a search for anomalous decay lengths in $t\bar{t}$-like events observed with the Collider Detector at Fermilab (CDF), and report a first direct limit on the t quark lifetime.

Sunday, April 23, 2006 3:15PM - 5:39PM –
Session L3 GGR COM: Advances in Numerical Relativity II Hyatt Regency Dallas Landmark C

3:15PM L3.00001 Simulations of Binary Black Hole Mergers , FRANS PRETORIUS, University of Alberta — I will review recent advances in the simulation of binary black hole mergers using a numerical scheme based on generalized harmonic coordinates. After a brief overview of the formalism and method I will show results from the evolution of several different classes of initial data, including unequal mass binaries and Cook-Pfieffer quasi-circular inspiral data sets.

3:51PM L3.00002 Numerical Simulation of Binary Black Holes , LAWRENCE KIDDER — The coalescence of binary black hole systems is expected to be an excellent source of gravitational radiation for detectors such as LIGO and LISA. Robust, accurate, and long-term numerical simulations of astrophysically realistic binary black hole systems have yet to be achieved, but tremendous progress towards this goal has been made recently. I will discuss some of the challenges involved, present recent results, and speculate about solutions to some of the remaining problems.

4:27PM L3.00003 Neutron Stars in Compact Binaries , THOMAS BAUMGARTE, Bowdoin College — In this talk I will review recent progress in numerical relativity simulations of neutron stars in compact binaries. I will first discuss the construction of initial data that model binary neutron stars and black hole-neutron star binaries in quasi-equilibrium. I will then describe dynamical evolution calculations of such binaries that simulate the neutron stars' coalescence, collapse or tidal disruption, and I will close by discussing some of the astrophysical implications of these simulations.

5:03PM L3.00004 Numerical simulations of generic singularities , DAVID GARFINKLE, Oakland University — Numerical simulations are performed of the approach to the singularity of spacetimes with no symmetries. In all cases the singularity is spacelike, and as it is approached, it is local in the sense that the terms in Einstein's equation with spatial derivatives become unimportant compared to those with time derivatives. The dynamics thus becomes locally that of a homogeneous spacetime, though a different homogeneous spacetime for each spatial point. In the case of a scalar field, these homogeneous spacetimes are of the Kasner type with power law behavior of the scale factors. In the vacuum case, the homogeneous spacetimes are Mixmaster type, with oscillatory behavior.