A-33: A New Analytic Formula for the Spectrum of Inflationary Curvature Perturbations

Shuichiro YOKOYAMA (Department of Physics, Kyoto University)

We derive a new analytic hybrid formula for the spectrum of the curvature perturbations, which combines the general slow-roll approximation and the long-wavelength approximation. This formula to evaluate the spectrum of initial curvature perturbations applies for a wider class of inflation models, including multi-scalar inflation models, and it will give a unified picture to generalization of slow roll formula.

A-34: CMB Temperature and Polarization Anisotropies Produced by the Primordial Magnetic Fields

Hiroyuki TASHIRO (Department of Physics, Kyoto University)

Primordial magnetic fields produce the Alfven mode. This mode can survive the Silk damping and can leave the trace on the cosmic microwave background radiation in the small scales. We calculate the anisotropies of the temperature and the B-mode polarization. We find that these anisotropies can dominate the anisotropies produced by other origins and we obtain the constraint of the primordial magnetic fields.

A-35: The Size of Primordial Black Holes

Tomohiro HARADA (Department of Physics, Kyoto University)

The size of primordial black holes is very relevant to the growth argument. I present upper limits on the size of any black holes forming in the early Universe for a variety of formation scenarios. In particular, we prove that the size of the apparent horizon of a primordial black hole formed by causal processes in a flat Friedmann universe is considerably smaller than the cosmological apparent horizon size for an equation of state $p = k \rho$ ($1/3 < k < 1$). This also applies for a stiff equation of state ($k = 1$) or for a massless scalar field. The apparent horizon of a primordial black hole formed through hydrodynamical processes is also considerably smaller than the cosmological apparent horizon for $0 < k \leq 1$. We derive an expression for the maximum size which an overdense region can have without being a separate closed universe rather than part of our own. Newtonian argument shows that a black hole smaller than the cosmological horizon can never accrete much.

B-1: The Time Evolution of Strongly Excited Magnetic Monopoles

István RÁCZ (MTA KFKI, Részecske-és Magfizikai Kutatóintézet)

The poster is to report about our results concerning the time evolution of strongly excited (highly nonlinear) $SU(2)$ magnetic monopoles in Minkowski spacetime. The investigation is carried out by means of numerical simulations. To have
a framework which is suitable for both to precisely describe the dynamics in the inner region, as well as, the energy transport to infinity the technique of conformal compactification along with the hyperboloidal initial value problem has been used.

**B-2: Three-Dimensional General-Relativistic Hydrodynamics with Whisky**

Luca BAIOTTI (Albert Einstein Institut)

We present a new three-dimensional fully general relativistic hydrodynamics code using high-resolution shock-capturing techniques and a conformal traceless formulation of the Einstein equations. We discuss its application to the study of the gravitational collapse of uniformly rotating neutron stars to Kerr black holes. The initial stellar models are modelled as relativistic polytropes which are either secularly or dynamically unstable and with angular velocities which range from slow rotation to the mass-shedding limit. We investigate the gravitational collapse by carefully studying not only the dynamics of the matter, but also that of the trapped surfaces, i.e. of both the apparent and event horizons formed during the collapse. We also present the first calculation of gravitational-wave emission produced in the gravitational collapse of uniformly rotating neutron to Kerr black holes in fully three-dimensional simulations. An essential aspect of these simulations is the use of progressive mesh-refinement techniques which allow to move the outer boundaries of the computational domain to regions where gravitational radiation attains its asymptotic form. The waveforms have been extracted using a gauge-invariant approach in which the numerical spacetime is matched with the non-spherical perturbations of a Schwarzschild spacetime.

**B-3: Some Recent Results in DSR**

Salvatore MIGNEMI (Dipartimento di Matematica, Universita' di Cagliari)

Deformed Special Relativity aims to describe phenomenologically quantum gravity effects assuming that the Planck energy is left invariant by a deformation of the Lorentz transformations. We review some recent results.

**B-4: Accelerating Cosmologies from M Theory on Twisted Spaces**

Ishwaraee Prasad NEUPANE (Department of Physics and Astronomy, University of Canterbury (Also at Tribhuvan University, Kathmandu )

The observation that the present expansion of the universe is accelerating has proved a challenge to fundamental theories such as string/M-theory, and its low-energy supergravity limits. Here we present new cosmological solutions arising from cosmological (dynamical) compactification of string/M theory on product spaces that include one or more geometric twists along the extra dimensions. Our solutions circumvent the no-go theorem, while retaining \textit{Ricci-flat internal spaces}. This considerably extends our knowledge of accelerating cosmologies from compactifications,