Name: **Diana Battefeld**
Institution: HIP/APC

Title: Staggered Multi-Field Inflation

Abstract: We investigate multi-field inflationary scenarios with fields that drop out of the model in a staggered fashion. This feature is natural in certain multi-field inflationary setups within string theory; for instance, it can manifest itself when fields are related to tachyons that condense, or inter-brane distances that become meaningless when branes annihilate. Considering a separable potential, and promoting the number of fields to a smooth time- dependent function, we derive the formalism to deal with these models at the background and perturbed level, providing general expressions for the scalar spectral index and the running. We recover known results of e.g. a dynamically relaxing cosmological constant in the appropriate limits. We further show that isocurvature perturbations are suppressed during inflation, so that perturbations are adiabatic and nearly Gaussian. The resulting setup might be interpreted as a novel type of warm inflation, readily implemented within string theory and without many of the shortcomings associated with warm inflation. To exemplify the applicability of the formalism we consider three concrete models: assisted inflation with exponential potentials as a simple toy model (a graceful exit becomes possible), inflation from multiple tachyons (a constant decay rate of the number of fields and negligible slow roll contributions turns out to be in good agreement with observations) and inflation from multiple M5-branes within M-theory (a narrow stacking of branes yields a consistent scenario).

Name: Mr **Carlos Coimbra-Araujo**
Institution: Cambridge U. and Campinas U.

Title: Some results about unparticles and cosmology from Herwig++

Abstract: Both the Feynman rules for unparticle physics plus some hadron processes as the matrix elements for a Drell-Yan interaction with spin-1 unparticle as resonance are implemented in the event generator Herwig++. The phenomenology involved is used to understand some decay aspects of unparticles as dark matter.

Name: Dr **Hristu Culetu**
Institution: Ovidius University

Title: Kinematic parameters for a spherical distribution of uniformly accelerated observers

Abstract: We consider a nongeodesic congruence of the velocity field vector and calculate the kinematic parameters associated to it. We found the shear tensor components are finite in time but diverge at the event horizon of the spacetime while the vorticity is constant.

The surface gravity on the horizon is just the proper acceleration of the uniformly expanding distribution of observers, in spherical Rindler coordinates. We find that the Raychaudhuri equation holds for our non-geodesic congruence of particle worldlines.

Name: Mr **Pierre-Philippe Dechant**
Institution: Cambridge University

Title: Non-singular and bouncing solutions in a biaxial Bianchi IX universe with scalar field matter

Abstract: We present a novel cosmological model in which scalar field matter in a biaxial Bianchi IX model leads to a non-singular solution. The hypersurface volume goes to zero instantaneously at the Big Bang, but all physical quantities, such as curvature invariants and the matter energy density remain finite, and continue smoothly through the Big Bang. This is in contrast to most other known background geometries, such as open and flat FRW-universes, or the essential singularities in the full triaxial Bianchi IX model for both perfect fluid and scalar field matter content. In our model, the scalar field drives both isotropisation and inflation. This therefore raises the question of whether structure on the largest scales was laid down at a time when the universe was still oblate. We also discuss the stability of such a biaxial scalar field model to small perturbations and draw an analogy with cosmological perturbations. We finally consider geodesics through the Big Bang and present another, genuinely bouncing, solution.

Name: Prof **Debashis Gangopadhyay**
Institution: S.N. Bose National Centre For Basic Sciences

Title: Dark Matter and Dark Energy from Lagrangian with Canonical Kinetic Terms

Abstract: In the context of the k-essence field, a lagrangian (incorporating Scherrer's scaling relation)is set up with canonical kinetic terms.
This lagrangian can account for both dark matter and dark energy. Presence of canonical kinetic terms ensure that the fundamentals of lagrangian field theory can be used effectively to understand cosmological scenarios. Cosmological quantities calculated from this lagrangian give reasonably good results and certain aspects of the early universe can also be studied in this formalism.

Name: Mrs **Anna Kaminska**
Institution: Helsinki Institute of Physics

Title: Inflation and Preheating in Supergravity with MSSM Flat Directions

Abstract: Motivated by the recent discussion about the role of flat directions, a typical feature of supersymmetric models, in the process of particle production in the early universe, a consistent model of inflation and preheating in Supergravity with MSSM fields has been built. It is based on a model proposed by M. Kawasaki, M. Yamaguchi and T. Yanagida. In the inflationary stage, the flat directions acquire high vacuum expectation values (VEVs), without spoiling the background of slow-roll, high-scale inflation consistent with the latest WMAP5 observational data. In the stage of particle production, following naturally inflation, the role of flat direction high VEVs depends strongly on effects connected with the Supergravity framework and non-renormalizable terms in the superpotential, which have been neglected so far in literature. Such effects turn out to be very important, changing the previous picture of preheating in the presence of large flat direction VEVs.

Name: Mrs **Simone Morelli**
Institution: University of Salento and INFN

Title: Gauged axions and anomaly-mediated interactions

Abstract: Effective models containing extended gauge structures (abelian extensions) may be naturally generated both in the case of effective string/extra dimensional scenarios and can be searched for both at the LHC and in future low-energy experiments at DESY. One of the characteristics of these is the presence of new mechanisms for anomaly cancellation, respect to the Standard Model (SM). I will try to overview the basic ideas which underline these constructions, emphasizing some of the field theory issues which are essential in order to give consistency to these models. In the check-list of these models are their physical spectrum, their unitarity properties, and the identification of selected processes which may be important in order to disentangle this class of models from the larger set of anomaly free abelian extensions of the SM.

Name: Prof **Wlodzimierz Piechocki**
Institution: Institute for Nuclear Studies

Title: Big-Bounce

Abstract: The nature of the big-bounce (BB) will be analyzed in the setting of the loop quantum cosmology (LQC). It will be argued that discretization of quantum geometry is only an assumption of LQC, i.e. the existance of an area gap cannot be derived from quantum gravity. Thus, determination of the critical density (CD) of matter at which BB occurs (obtained within LQC for homogeneous models) cannot be trusted. It will be speculated that if dispersion of cosmic photons is realistc, it may be used in favour of the assumption on discretisation of geometry.

Name: Dr **Alan Miguel Velásquez Toribio**
Institution: Centro Brasileiro de Pesquisas Físicas

Talk: Dark Energy and Bulk Viscosity

Abstract: In this paper we explore a theory of viscosity for the dark energy.
In particular, we use the model of Israel-Stewart for the bulk viscous stress. This model take into account second order deviation term in the equation of transport of the bulk viscous stress. We use as dark uid a parametrization of two-parameters, the so-called CPL parametrization (w(z)=w0 + w1 \frac{z} {1+z}). We develop and show a simple method to recon-struct the dark energy density of a uid with viscosity. In order to obtain the observations constraints using SNIa and BAO, we assume widely accepted ad hoc relation for the coefficients

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Name: Mr **Gilles Vertongen**
Institution: Université Libre de Bruxelles

Title: Is leptogenesis falsifiable at LHC?

Abstract:: It is well known that the leptogenesis mechanism offers an attractive possibility to explain the baryon asymmetry of the universe. Its particular robustness however comes with one major difficulty: it will be very hard if not impossible to test experimentally in a foreseeable future, as most of the mechanics typically takes place at high energy or results from suppressed interactions, without unavoidable low-energy implications. An alternate approach is taken by asking: can it be at least falsified? We show that possible discoveries at current and future colliders, most notably that of right-handed gauge interactions, would indeed forbid at least the "canonical" leptogenesis mechanisms, namely those based on right-handed neutrino decay. General lower bounds for successful leptogenesis on the mass of the right-handed gauge boson W_R are given. Other possibilities to falsify leptogenesis, including from the observation of a Z', are also considered.

Name: Mr **Sebastian Zajac**
Institution: University of Silesia

Title: Neutrino Oscilations in the case of general interaction

Abstract: I will present the process of the neutrino production, oscillation in the vacuum or in matter, and detection in the case of interactions which are beyond the SM. Neutrino states are described by density matrix. The final neutrino production rate does not factorize.
