Abstract

Date of talk	Time	Participant - Talk title - Coautors - Abstract
Tuesday, 16	18:25	**Arkhangelskaja Irene**

Modeling Temporal Profiles Of GRB In Fireball Model And Fractal Indexes Of These Temporal Profiles

**Modeling temporal profiles of GRB in fireball model and fractal indexies of these temporal profiles.
The simulations of GRB time profiles in fireball model with shock waves are studied. Fractal indexies for these simulations of burst time profiles are discussed.
Fractal indexies of sumulated time profiles are in region from 1.213 to 1.400, which can correspond to subclass of short bursts with <D>=1.31 and subclass of middle GRB with <D>=1.36. Moreover, fractal index of time profile of simulation with some parameters is equal to fractal index of real burst GRB990208.**

Tuesday, 16	19:20	**Bertone Gianfranco**

The Thomas-Fermi model as a powerful tool for Relativistic Astrophysics

Tuesday, 16	17:25	**Bianco Carlo Luciano**

Clock synchronization in Gamma-Ray Bursts

I will discuss how the synchronization between the different temporal coordinates used in Gamma-Ray Burst description can heavily affect the comparison between theoretical predictions and observational data.

Thursday, 18	17:00	**Bini Donato**

Special Observers in Stationary Axisymmetric Spacetimes

Thursday, 18	15:10	**Bisnovatyi-Kogan Gennady S.**

Magnetic Field Generation During Accretion Onto A Black Hole

**We revisit the problem of magnetic field generation in accretion flows onto black holes owing to the excess radiation force on electrons.
The radiative force causes the magnetic field to initially grow linearly with time.
However, this linear growth holds for only a restricted time interval which is of the order of the accretion time of the matter.
The large magnetic fields recently found result from the fact that the linear growth is unrestricted.
The simplified model of the magnetic field generation in the accretion flow due Pointing-Robertson effect is solved exactly in GR for a Schwarzschild geometry.
Large magnetic field in the vicinity of a black hole may appear only due to external electrical currents.**

Abstract

Date of talk	Time	Participant - Talk title - Coautors - Abstract

Tuesday, 16 **12:20** **Calzetti Daniela**

The Impact of Dust in the Low and High Reshift Universe

Presence of dust in galaxies removes half or more of the stellar energy from the UV-optical budget of the Universe and has profound impact on our understanding of how galaxies evolve. Measures of opacity in local galaxies are reviewed together with widely used theoretical and empirical methods for quantifying its effects. Scarcity of coherent multiwavelength datasets hampers our ability to derive reliable obscuration estimates in intermediate and high redshift galaxies. This, in turn, limits the reliability of inferred physical quantities, such as star formation rates, stellar population ages, galaxy luminosity functions, and others.

Friday, 19 **15:50** **Cipriani Piero**

An effective Microcanonical Ensemble for N-body Self-Gravitating systems

Sebastiano Merzetti, C.S.S. - Poggio Mirteto (RI)

It is shown how, starting from "basic assumptions" at the grounds of the statistical description of Many degrees of freedom hamiltonian systems, it is possible to define a self-consistent effective generalization of a nonstationary microcanonical ensemble for gravitational N-body systems, to derive a "Second Law" criterion, whose predictions agree with the actual behaviour of real or numerically simulated systems.

Thursday, 18 **09:53** **Ciufolini Ignazio**

Frame Dragging and Gravitomagnetism: Theory and Experiment

After a brief introduction on the general relativistic, gravitomagnetic, phenomena arising in the vicinities of a spinning body, due to its rotation, we describe the time-delay of photons by the spin of a central body and of photons propagating inside a massive rotating shell. In the case of gravitational lensing there may be an appreciable time delay between the arrival time of different images on Earth.
We then describe the latest results in the measurement of the Lense-Thirring effect by analyzing the orbits of the two laser-ranged satellites LAGEOS and LAGEOS II; this method has provided a direct measurement of Earth's gravitomagnetism with accuracy of the order of 20 %.
A future accurate measurement of the Lense-Thirring effect will include the LARES experiment to measure "frame-dragging" and to provide other basic tests of general relativity and gravitation.

Tuesday, 16 **09:35** **Damour Thibault**

Chaos and Symmetry in String Cosmology

String theory suggests deep modifications of Einstein's general relativity that might affect both low-energy and high-energy gravitational physics. We shall review recent progress in string cosmology which shows the universality of the type of chaotic behaviour discovered by Belinskii, Khalatnikov and Lifshitz, and relates it to deep symmetry structures of string theory.

Abstract

Date of talk	Time	Participant - Talk title - Coautors - Abstract
Friday, 19	09:00	De Bernardis Paolo
		Archeology Of The Universe Through Images Of The Cosmic Microwave Background
		BOOMERanG team
		The balloon borne experiment BOOMERanG recently produced a resolved image of the Cosmic Microwave Background (CMB), coming from an epoch when the Universe was 50000 times younger, 1000 times hotter and 1 billion times denser than today. Other balloon-borne and ground-based experiments have reported consistent results. We describe the adopted experimental methods, which exploit the newest bolometric, cryogenic and optical technologies for the the payload. We then describe the data analysis used to obtain the maximum likelihood maps and the angular power spectrum of the CMB fluctuations. In this spectrum three peaks are evident, at multipoles 210, 540, 830. The spectral analysis allows to determine, in the framework of adiabatic inflationary theory and together with other measured cosmological quantities, the most important cosmological parameters (curvature, spectrum of fluctuations, composition etc.) with good precision, thus giving a very consistent picture of the new cosmology.
Friday, 19	11:00	Demianski Marek
		Large Scale Structure And The Nature Of Dark Matter In The Universe
		A brief review of the large scale structure of matter distribution in the universe will be presented. Using observational data and results of theoretical considerations we derive restrictions on the mass of dominant fraction of dark matter particles.
Monday, 15	15:30	Deruelle Nathalie
		Braneworld Cosmologies
Monday, 15	11:55	Fang Li-Zhi
		Scaling of the Large Scale Structures of the Universe
		Search for various scaling of the large scale structures is a basic method to reveal the clustering behavior of cosmic mass and velocity fields in non-linear regime. I will review the dynamical basis and some new developments of this topic.
Friday, 19	13:00	Feng LongLong
		Measuring the Galaxy Power Spectrum with Multiresolution
Tuesday, 16	18:10	Fraschetti Federico
		Problems On Spectrum In Gamma-Ray Bursts
		An overview is presented on the problems on the spectral profiles and spectral evolution of the Gamma-Ray Burst phenomenon. The formula of Band and its use which has been made in experimental analysis are briefly discussed.

Abstract

Date of talk	Time	Participant - Talk title - Coautors - Abstract
Thursday, 18	18:20	Germani Cristiano

Gravitational Collapse From Holographic Point Of View

In the contest of the braneworld RS2 model we find that the external solution of a collapsing cloud can not be static. We find a Ricci anomaly that can be reinterpreted in a holographic way as due to Hawking radiation from a black hole.

Tuesday, 16	12:50	Giavalisco Mauro

Galaxies At Very High Redshift

Monday, 15	16:10	Gursky Herbert

The Discovery of Neutron Stars and Black Holes

The discovery of Neutron Stars and Black Holes can be divided into three distinct periods. During the first phase, between 1926 and 1939, the theoretical foundation for the objects was put in place. Following the recognition that the matter in white dwarfs was a degenerate electron gas, the mass limit for white dwarfs was developed and with that the realization that gravitational collapse to a black hole could occur. Following the discovery of neutrons, the theory of neutron stars was developed, in analogy to white dwarfs. Following world war II the observers dominated the field. The evolving discipline of radio astronomy led to the discovery of radio stars as high redshift, higly luminous objects and the discovery of pulsars and the recognition that they were neutron stars. The discovery of bright x-ray sources in 1962 led to uncovering of the accretion powered binary x-ray stars, with neutron stars and blackholes as the collapsed companion. The modern x-ray facilities, Chandra, XMM, RXTE and others have an enormous amount of information relating to neutron stars and black holes. A number of pulsing x-ray and radio sources have yielded masses, all consistent with 1.4 solar masses. These objects must be neutron stars.. Other bright x-ray sources show much higher masses, about 5 to 10 solar masses. They do not pulse, but show time variability down to milliseconds. They must be blackholes. On a galactic scale, mass measurements of galactic nuclei reveal massive cores ranging from a few million solar masses to a few billion solar masses.

Friday, 19	01:00	Gurzadyan Vahe

Ellipticity Analysis of the Boomerang CMB Maps

V.G. Gurzadyan, P.A.R. Ade, P. de Bernardis, C.L. Bianco, J.J. Bock, A. Boscaleri, B.P. Crill, G. De Troia, K. Ganga, M. Giacometti, E. Hivon, V.V. Hristov, A.L. Kashin, A.E. Lange, S. Masi, P.D. Mauskopf, T. Montroy, P. Natoli, C.B. Netterfield, E. Pascale, F. Piacentini, G. Polenta, J. Ruhl

The properties of the Cosmic Microwave Background(CMB) maps carry valuable cosmological information.
Here we reportthe results of the analysis of ellipticity of the hot and cold CMBanisotropy spots in the BOOMERanG 150 GHz map.
We carried out thisanalysis for the map obtained by summing independent measurementchannels (signal plus noise map) and for a comparison map (noiseonly map) obtained by differencing the same channels.
Theanisotropy areas (spots) have been identified for both maps forvarious temperature thresholds. The orientation (obliquity) of thespots is random for both maps. We computed the mean elongation ofspots obtained from the maps at a given temperature threshold. Wefound that for the sum map there is a region of temperaturethresholds where the average elongation is not dependent on thethreshold. Its value is about 2.3 for cold areas and 2.2 for hot areas. The threshold independent and random obliquitybehaviour in the sum map is stable against pointing reconstructionaccuracy and noise level of the data, thus confirming that theseare actual properties of the dataset.
In the sum map theanisotropy areas are elongated more homogeneously than in the difference map.
Analogous elongation properties of CMBanisotropies had been detected for COBE-DMR 4 year data.

Abstract

Date of talk | Time | Participant - Talk title - Coautors - Abstract

Friday, 19 **17:45** **Imponente Giovanni Paolo**

Mixmaster Chaoticity as Semiclassical Limit of the Canonical Quantum Dynamics

Within a cosmological framework, we provide a Hamiltonian analysis of the Mixmaster Universe dynamics on the base of a standard Arnowitt-Deser-Misner approach, showing how the chaotic behavior characterizing the evolution of the system near the cosmological singularity can be obtained as the semiclassical limit of the canonical quantization of the model in the same dynamical representation. The relation between this intrinsic chaotic behavior and the indeterministic quantum dynamics is inferred through the coincidence between the microcanonical probability distribution and the semiclassical quantum one.

Thursday, 18 **12:00** **Israel Gianluca**

RXJ0806.3+1527: Optical/X-Ray Simultaneous Observations Of The Shortest Known Orbital Period Binary System

**I will report on recent simultaneous X-ray and optical observations of RXJ0806.3+1527, which with an orbitla period of only 321s, represents the most compact binary system ever discovered.
Implication on the expected emission of gravitational waves,and on accretion mechanisms will be reported.**

Monday, 15 **12:30** **Jantzen Robert**

Caught in the Relativity Web: My 30 Years Near Remo's World Line

Princeton played an important role not only in the renaissance of general relativity that occurred in the 1960s and 1970s, but also in Remo's career. A brief overview is given of the background story through the lens of my own connections to Princeton and Remo and my subsequent work in Bianchi cosmology and the geometry of spacetime splittings.

Friday, 19 **11:45** **Lattanzi Massimiliano**

Neutrino Cosmology

Thursday, 18 **12:40** **Lee Hyung Won**

Numerical solution of Schwarzschild Black hole

**Numerical approach to solve Einstein equation can give a clue how one can design the next generation gravitational wave observation experiment.
In this view point, it is important to understand how we can implement discretized Einstein equation with appropriate gauge condition.
Here I want to review the numerical method for general relativity by explaining detailed algorithm for Schwarzschild black hole.**

Monday, 15 **17:20** **Mashhoon Bahram**

Nonlocality of Accelerated Systems

The Hypothesis of Locality in the framework of the standard theory of relativity is elucidated. The limitations of this hypothesis are pointed out and a nonlocal theory of accelerated observers is described. The observational consequences of this theory are discussed.

Abstract

Date of talk	Time	Participant - Talk title - Coautors - Abstract
Friday, 19	15:00	Montani Giovanni

Dark Matter as an Issue for Revised Canonical Quantum Gravity

We write down a quantum gravity equation which generalizes the Wheeler-DeWitt one in view of including a time dependence in the wave functional.
The obtained equation provides a consistent canonical quantization of the 3-geometries resulting from a "gauge-fixing" (3 + 1)-slicing of the space-time.
We propose a physical interpretation of the introduced "kinematical" variables which is based on the analogy with the so-called {\em Gaussian reference fluid}.
The cosmological implementation of the theory leads to identify the resulting matter fluid as a candidate for the dark matter.

Thursday, 18	09:00	Narozhny Nikolay

Two Aspects Of The Unruh Problem

A.M. Fedotov, V.D. Mur and V.A. Belinski

According to Unruh, a detector moving with constant proper acceleration in empty Minkowski spacetime reveals universal, not depending on inner structure of the detector, thermal response. We have analised two aspects of the Unruh effect : (i) interpretation of properties of quantum field restricted to a subregion of MS and (ii) behaviour of a particular accelerated detector. It is shown that the Unruh quantization procedure implies setting a boundary condition for the quantum field operator which changes the topological properties and symmetry group of the spacetime and leads to field theory in two disconnected left and right Rindler spacetimes instead of Minkowski spacetime. A special scalar background realizing the accelerated reference frame is constructed. An elementary particle detector accelerated uniformly by the external scalar field is considered. It is shown that such a detector does not reveal the Unruh (thermal) response. The physical reason is due to the absence of creation of the detector-antidetektor pairs in the scalar background.
Thus we conclude that there is no compelling evidence for the universal behavior attributed to all uniformly accelerated detectors.

Monday, 15	10:45	Ne'eman Yuval

A Guided Tour Along The 4th, 5th - To 11th Dimensions, With Foreign Currency

Tuesday, 16	15:00	Piro Luigi

The Observational Situation Of Grbs

Tuesday, 16	11:10	Pizzella Guido

Gravitational Wave Experiments With Resonant Detectors

Experiments with resonant detectors started more than 30 years ago. The status of these experiments will be presented. In particular the observation by the Rome group of signals due to cosmic rays will be shown and discussed.

Abstract

Date of talk	Time	Participant - Talk title - Coautors - Abstract

Tuesday, 16 **18:45** **Pucacco Giuseppe**

Killing Tensors and Integrability of Geodesic Flows

**Geometrization of the dynamics by using the Jacobi metric is a standard tool to turn a Hamiltonian system into a geodesic flow over a conformal (pseudo-)Riemannian manifold.
Therefore, it is natural to investigate integrability of those systems by looking for invariants corresponding to Killing tensors of this geometry.
In the particular case of two dimensions, every pseudo-Riemannian metric can be expressed in conformal form. In this instance we discuss the existence of new integrable systems both at fixed and arbitrary energy.**

Tuesday, 16 **19:10** **Sigismondi Costantino**

Enrico Fermi and the Comets

Francesca Maiolino

**For his abilitation thesis at the "Scuola Normale Superiore" of Pisa, Enrico Fermi presented in 1922 a theorem of statistics with an application to the case of comets.
He studied the dynamics of comets with coplanar orbit to that one of Jupiter, under the gravitational influence of the Sun and Jupiter.
The cosmogony of the Solar System is sketched addressing also to the works of Lagrange, Tisserand, Poincare', Hill, Kuiper and Oort.**

Friday, 19 **16:55** **Song Doo Jong**

Cosmological Kinetic Theory In A Homogeneous Spacetime

We study the perturbations of kinetic components on the ground of Boltzmann transport equation in the Bianchi type I spacetime.

Thursday, 18 **16:10** **Sonnino Giorgio**

Thermodynamic Field Theory: The Non-Linear Hall Effect

In previous papers, it has been shown that the evolution of thermodynamic systems is well described in the Wheyl's space. In the particular case in which the thermodynamic forces and conjugated flows are linked only through a symmetric tensor (the metric tensor), the resulting geometry is the Riemannian geometry. When a material is simultaneously submitted to magnetic fields and current flows, the Thermodynamic Field Theory (TFT) foresees a new non-linear effect (the non-linear Hall effect). This new effect will allow on one side to test the validity of the theory and, on the other side, to measure the value of the constant c.

Thursday, 18 **11:11** **Stella Luigi**

Relativistic Effects in Binary Systems

Abstract

Date of talk	Time	Participant - Talk title - Coautors - Abstract
Tuesday, 16	16:00	Tavani Marco

Gamma-Ray Sources: A Challenge From Neutron Stars To Gamma-Ray Bursts

We review the current status of our knowledge of astrophysical sources emitting radiation in the range between 10 MeV and 10 GeV. Gamma-rays provide a crucial diagnostics of processes occurring near relativistic compact objects such as neutron stars and black holes. About three hundred persistent gamma-ray sources and several thousands gamma-ray bursts have been detected. We will discuss the astrophysical implications of these discoveries, the different populations of gamma-ray emitters, and the observational and theoretical challenges of future space missions.

Tuesday, 16	09:20	Teitelboim Claudio

Friday, 19	12:25	Vereshchagin Gregory

Gravitational Instability In An Expanding Multicomponent Fluid

The problem of small perturbations in expanding Universe filled by several kinds of matter is discussed. We show that solution for baryonic or hot dark matter dominated cases cannot be applied to the model with mixture of these components. Numerical solutions for different cosmological parameters are analyzed and contrasted. The general model includes also cosmological constant and cold dark matter component. It is shown, that when WHDM>WB the perturbations in hot dark matter component influence significantly on perturbations in other components.

Monday, 15	18:00	Vitagliano Luca

The Irriducible Mass Of The Black Hole

Tuesday, 16	17:10	Xue She Sheng

Dyadosphere of black hole and Gamma Ray Bursts

Basic energy requirements of Gamma Ray Burst(GRB) sources can be easily accounted for by a pair creation process occurring in the "Dyadosphere" of a Black Hole endowed with an electromagnetic field (abbreviated to EMBH for "electromagnetic Black Hole").
The "Dyadosphere" is defined as the region outside the horizon of an EMBH where the electromagnetic field exceeds the critical value for e^+ e^- pair production. In a very short time
~O(\hbar/ mc^2), very large numbers of pairs are created there.
We show that this process does occurs during a gravitational collapse towards the formation of the horizon of an EMBH. Further evolution then leads naturally to a relativistically expanding pair-electromagnetic-pulse (PEM-pulse).
From a fundamental point of view, this reversible process represents the first mechanism proved capable of extracting large amounts of energy from a Black Hole with an extremely high efficiency (close to 100%) and can be directly observed in short GRBs.

Abstract

Date of talk	Time	Participant - Talk title - Coautors - Abstract

Friday, 19 **18:10** **Zakharov Alexander**

The iron K_α-line diagnostics of a rotational black hole metric

**The original idea to show the spacetime geometry using few geodesics was developed by Johnson and Ruffini (1974).
We used this idea to interprete the observational data from rotating BH's. We developed the imitational approach to simulate a propagation of radiation near BH's.
In example, we solved the problem about an interpretation of observational properties of active galactic nuclei (Zakharov, MNRAS, 1994).
Another important problem for this approach is the diagnostics of a black hole metric using X-ray observational data of the iron K_α-line.
Observations of Seyfert galaxies in X-ray region reveal the wide emissive lines in their spectra, which can arise in inner parts of accretion disks, where the effects of General Relativity (GR) must be counted. A spectrum of a solitary emission line (the K_α-line of iron, for example) of a hot spot in Kerr accretion disk is simulated, depending on the radial coordinate r and the angular momentum $a=J/M$ of a black hole, under the assumption of an equatorial circular motion of a hot spot. Basing on results of numerical simulations
it is shown that the characteristic two-peak line profile with the sharp edges arises at a large distance, (about $r \approx (3-10)r_g$). The inner regions emit the line, which is observed with one maximum and extremely wide red wing.
High accuracy future spectral observations, being carried out, could detect the angular momentum a of the black hole.
We analysed the different parameteres of problems on the observable shape of this line and discussed some possible kinds of these shapes.
The total number of analysed geodesics is more than 10^8 (to simulate possible shapes of the K_α-line), so the number is great enough, especially in comparison with few geodesics in the original paper by Johnson and Ruffini (1994).**

Friday, 19 **17:30** **Zalaletdinov Roustam M.**

Modelling Self-Gravitating Macroscopic Media in General Relativity

G. Montani, R. Ruffini

**The problem of construction of a continuous (macroscopic) matter model for a given point-like (microscopic) matter distribution in general relativity is considered. A brief review on the existing approaches is given. The physical and mathematical analogies with the problem of modelling the macroscopic (continuous) charge and current distributions in classical macroscopic electrodynamics are discussed. In particular, the procedure of Szekeres in the linearized general relativity on Minkowski background to construct a tensor of gravitational quadruple polarization is shown to have some inconsistencies. The results on the formulation of the macroscopic (continuous) matter model for a congruence of pointlike particles moving in their own effective gravitational field which form into groups ("gravitational molecules") due to gravitation for the case of the smooth weak (linear) gravitational field are presented.
The approach utilizes a system of the Isaacson's equations (macroscopic field equations) with a source incorporating the quadruple gravitational polarization tensor and Isaacson's energy-momentum tensor together with a suitable set of material relations between these two tensors. Solutions to this system for some static matter distributions are discussed. Further development of the approach is outlined.**
