

3rd Galileo-XuGuangqi Meeting
11-15 October 2011 – Beijing (China)
Morning Sessions

Tuesday 11th	Wednesday 12th	Thursday 13th	Friday 14th	Saturday 15th
X and Gamma Ray Astrophysics	Gravitational waves and precision tests of general relativity	General Relativity, GRBs, neutron star and supernovae	Astroparticle Physics	Cosmology, Large Scale Structure and Dark Matter
<i>Multifunctional Hall</i>	<i>Multifunctional Hall</i>	<i>Multifunctional Hall</i>	<i>Multifunctional Hall</i>	<i>Multifunctional Hall</i>
Chairs: Frontera Filippo Li Tipei	Chairs: Blair David Zhu Zong Hong	Chairs: Boer Michel Zhang Bing	Chairs: Battiston Roberto Chen Pisin	Chairs: Chen Xuele Della Valle Massimo
<i>Opening Speech</i> Ruffini Remo - Li Tipei Yan Jun - Zhao Gang Hao Jinxin - Xue She-Sheng <i>Group Photo</i>				
9:10-9:40	9:00-9:30	8.30-9.00	9:00-9:30	9:00-9:30
Frontera Filippo	Wen Linging	Zhang Bing	Pisin Chen	Wang Lifan
5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion
9:45-10:15	9:35-10:05	9.05-9.35	9:35-10:05	9:35-10:05
Li Tipei	Yanbei Chen	Della Valle Massimo	Battiston Roberto	Bernabei Rita
5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion
10:20-10:30	10:10-10:30	9.40-10.00	10:10-10:30	10:10-10:30
Coffee Break				
10:30-11:00	10:30-11:00	10.00-10.30	10:40-11.10	10:30-11:00
Shuangnan Zhang	Takaaki Kajita	Ruffini Remo	Fiorini Ettore	Ji Xiangdong
5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion
11.05-11:35	11.05-11:35	10.35-11.05	11.15-11:45	11.05-11:35
Tavani Marco	Luo Jun	Dai Zigao	Wang Yifang	Casolino Marco
5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion
11:40-12:10	11:40-12:10	11.05-11.35	11:50-12:20	11:40-12:10
Sinnis Gus	Everitt Francis	Rueda Jorge	Westerhoff Stefan	De Bernardis Paolo (skype connection)
5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion	5 minutes discussion
			12.25-12.50	
			Cao Zhen	
Lunch Break				
	Public Lecture Prof. David Blair Beijing University - 7pm		Public Lecture Prof. Everitt Francis Tsinghua Univ. - 7.30pm	Public Lecture Prof. Ruffini Remo Peking University – 7pm

Tuesday 11th October

X and Gamma Ray Astrophysics

Frontera Filippo

University of Ferrara and INAF/IASF-Bologna

Title: *Prospects for Gamma-ray Focusing Telescopes beyond 70/100 keV*

Abstract: I will report on the prospects for focusing telescopes in the soft gamma-ray band ($>70/100$ keV). These telescopes could open a new window in X-ray astronomy. Indeed the current instrumentation is background limited and many issues that could be solved with deep observations in this band are still open.

I will also discuss these issues and the scientific prospects of the development activity in our Department devoted to Laue lenses for space astrophysics.

Li Tipei

IHEP Chinese Academy and Tsinghua University

Title: *Scientific objectives of the HXMT mission*

Abstract: The hard X-ray modulation telescope HXMT is the first dedicated astronomy satellite in China launched around 2015. H X M T is an assembly of a high energy detector HE (20-250 keV), medium energy detector ME (5-30 keV), and low energy detector LE (1-15 keV). All the three detectors are slat-collimated with similar field of view, comprising an observatory to perform high signal-to-noise ratio pointing observations of high-energy sources in a wide band. HXMT can also perform imaging by an all-sky scan survey. In this talk I will introduce the scientific objectives of the HXMT mission.

Zhang Shuangnan

IHEP Chinese Academy and Tsinghua University

Title: *Prospects for future High Energy Astrophysics missions in China*

Abstract: In this report, I will first summarize briefly the strategic goal and programs of China's near and long space astronomy program, then describe the current space high energy astrophysics missions to be launched within the next five years, including its first space astronomy satellite the Hard X-ray Modulation Telescope (HXMT) mission, the Space Viable Object Monitor (SVOM), the space dark matter detection satellite, and the gamma-ray burst polarization observation experiment (POLAR) onboard China's spacelab. I will finally outline China's future plan on space astronomy program, including space astronomy satellites and instruments on China's space station.

Tavani Marco

INAF-IASF Roma and Università di Roma "Tor Vergata"

TBD

Sinnis Gus

Los Alamos National Laboratory

Title: *TeV Astrophysics with the Milagro and HAWC Arrays*

Abstract: Ground-based gamma-ray astronomy has historically implemented two dramatically different techniques. One method employs Imaging Atmospheric Cherenkov Telescope(s) (IACT) that detect the Cherenkov light generated in the atmosphere by extensive air showers. The other method employs particle detectors that directly detect the particles that reach ground level - known as Extensive Air Shower (EAS) arrays. Until recently, the IACT method had been the only technique to yield solid detections of TeV gamma-ray sources. Utilizing water Cherenkov technology, Milagro, was the first EAS array to discover new gamma-ray sources and demonstrated the power of and need for an all-sky high duty cycle instrument in the TeV energy regime. The transient nature of many TeV sources, the enormous number of potential sources, and the existence of TeV sources that encompass large angular areas all point to the need for an all-sky, high duty-factor instrument with even greater sensitivity. In this talk I will discuss results from the Milagro Observatory and plans for the HAWC Observatory at the volcan Sierra Negra in Mexico

Wednesday 12th October

Gravitational waves and precision tests of general relativity

Wen Linqing

University of Western Australia

Title: *Synergy of Gravitational wave and electromagnetic astronomy in the era of advanced detectors*

We are expecting the first detection of gravitational waves in the next decade. With the recent development of advanced detection technology, we will be able to provide early warnings of gravitational wave events to alert electromagnetic telescopes for prompt follow-up observations. I'll review the scientific motivation and current effort in this aspect, and discuss the role of the existing and future detector network.

Yanbei Chen

University of Western Australia

Gravitational wave detectors as quantum instruments

Takaaki Kajita

University of Tokyo

Title: *The Large scale Cryogenic Gravitational Wave Telescope (LCGT) Project*

Abstract: Large scale Cryogenic Gravitational Wave Telescope (LCGT) is a project for the direct detection of gravitational wave signals. It will be a interferometer with 3km * 3km arms. It will be located underground Kamioka, Japan. In order to achieve a high sensitivity, LCGT will use cryogenic temperature mirrors. The construction has started in 2010. It is expected to start the observation in 2017 with the full detector setup. In this talk, I will report the design and the construction status of LCGT.

Luo Jun

Huazhong University of Science and Technology

TBD

Everitt Francis

Stanford University - W.W. Hansen Experimental Physics Laboratory

Title: *Frame-dragging, Cryogenics, and Space: The Gravity Probe B Experiment*

Abstract: Probe B experiment, launched in 2004, displays both along with the fascinating intersection of physics and engineering in a real-life flight experiment. This critical collaboration has produced 86 Stanford doctorates and 14 from other universities, over an extraordinary range of topics. According to Einstein, a gyroscope in a 640 km polar orbit around the Earth is subject to two non-Newtonian precessions, a 6.6 arc-s/yr geodetic effect in the plane of the orbit and a 0.039 arc-s/yr frame-dragging effect due to the rotation of the Earth. Gravity Probe B measured both. To determine these tiny effects required a gyroscope 107 times better than the best Earth-based inertial navigation gyroscopes and a reference telescope 103 times better than any prior star tracker. The talk will describe the unique combination of cryogenics and space technologies that made this possible, and also some on-orbit surprises and how they were overcome. Space makes new physics possible in 8 distinct ways. GP-B has been the largest of a series of NASA missions in Fundamental Physics. The flight experience will inform the development of several important future missions including LISA and STEP

Thursday 13th October

General Relativity, GRBs, neutron star and supernovae

Zhang Bing

University of Nevada Las Vegas

From Swift to Fermi: A paradigm shift in GRB modeling

Della Valle Massimo

Osservatorio di Capodimonte

Title: *The Empirical Grounds of the Supernova-Gamma-ray Burst Connection*

Abstract: I'll review the observational status of the Supernova and Gamma-ray Burst connection including the recent observations of SN 2010bh/GRB 100316D

Izzo Luca

University of Rome "Sapienza"

TBD

Dai Zigao

Nanjing University

Gamma-Ray Bursts: Early Afterglows, High-Energy Emission, and Cosmology

Rueda Jorge

University of Rome "Sapienza" and ICRANet

Title: *On the Einstein-Maxwell-Thomas-Fermi equations of equilibrium for white dwarfs and neutron stars*

Abstract: Recent results on the formulation of a self-consistent theory for white dwarfs and neutron stars including strong, weak, electromagnetic, and gravitational interactions are outlined. First, the extension of the Feynman-Metropolis-Teller approach of the compressed atom to relativistic regimes is formulated and applied to white dwarfs within the framework of general relativity. Based on such a treatment, we go one step further by proving the impossibility of imposing the condition of local charge neutrality in a self-gravitating system of degenerate neutrons, protons and electrons in beta-equilibrium. The coupled system of the general relativistic Thomas-Fermi equations and the Einstein-Maxwell equations are constructed superseding the traditional Tolman-Oppenheimer-Volkoff equations. Special emphasis is given to the equilibrium conditions represented by the constancy of the general relativistic chemical potentials, for short Klein potentials, both for zero and finite temperatures. It is also shown the extension of the theory including strong interactions between nucleons through the relativistic extended Walecka model. This treatment represents an essential step to the correct formulation of a self-consistent relativistic field theoretical approach of neutron stars. The implications of these new Einstein-Maxwell-Thomas-Fermi equations of equilibrium on the structure and consequently on the astrophysics of neutron stars are also presented.

Friday 14th October***Astroparticle Physics*****Cao Zhen**

IHEP Chinese Academy

Title: *ARGO-YBJ: a Multi-purpose Experiment Operation for 5 Years*

Abstract: In last 5 years since the ARGO-YBJ experiment was turned on for cosmic ray data taking in 2006, many progresses have been made on observation of galactic gamma ray sources, long term monitoring on extragalactic gamma ray sources for multi-wavelength analysis, measurements of cosmic ray energy spectrum, anisotropy of arrival directions, interaction cross section between proton and atmospheric nuclei, estimates of the IMF intensities and upper limit setting for the anti-proton flux, etc. In this report, an overall summary will be delivered about all the measurements and potential developments. A future experiment, LHAASO, will be briefed as a natural extension of all the researches with greatly enhanced sensitivities in 5-10 years

Battiston Roberto

University of Perugia and INFN

Title: *Astroparticle physics from space: status of the AMS experiment*

Abstract: One century after the discovery of Cosmic Rays the study of cosmic radiation still carries intact its potential for new fundamental physics discoveries. During the last decade very sophisticated, state of the art satellites as well as new types of powerful ground based telescopes and underground detectors have produced a wealth of new results and some puzzling hints for new physics. I will review the status of in the field of astroparticle physics, discussing the potential of the recently launched Alpha Magnetic Spectrometer, the large observatory installed on the ISS, to search for the existence of nuclear antimatter and to study the origin of dark matter.

Wang Yifang

IHEP Chinese Academy

Daya Bay reactor neutrino experiment

Fiorini Ettore

University of Milan

Title: *Neutrino Physics and Astrophysics*

Abstract: The new results on oscillations of solar, atmospheric, reactor and accelerator neutrinos will be briefly reported with their consequences on the existence of massive neutrinos. The present results on the limit on neutrino mass based on cosmology and especially on single and double beta decay will be presented and discussed together with an overview of running and planned experiments. Special relevance will be given to experiments aimed to reveal the Dirac or Majorana nature of the neutrino

Westerhoff Stefan

University of Wisconsin-Madison

Title: *New Results from the IceCube Neutrino Telescope*

Abstract: IceCube is a cubic kilometer-scale neutrino telescope located at the geographic South Pole. The detector comprises 5,160 photomultipliers deployed on 86 strings at depths of 1.5-2.5 km below the polar ice sheet. It uses the clear Antarctic ice as a Cherenkov medium to detect high-energy cosmic neutrinos from the most violent astrophysical sources. The sensitivity of IceCube to low-energy neutrinos is enhanced by DeepCore, a dense sub-array of 6 strings in the center of the detector.

The IceCube detector is also complemented by IceTop, a square-kilometer air shower array deployed on the surface of the ice sheet above IceCube. The construction of IceCube was completed in December 2010, but measurements with the partially-constructed detector have been ongoing for several years. We present initial results of searches for neutrinos from astrophysical sources such as supernova remnants, active galactic nuclei, and gamma ray bursts, for anisotropies in cosmic rays, and constraints on the dark matter scattering cross section

Saturday 15th October***Cosmology, Large Scale Structure and Dark Matter*****De Bernardis Paolo**

University of Rome

Title: *CMB observations: Planck and beyond.*

Abstract: Current observations of the Cosmic Microwave Background include extremely sensitive surveys of the polarization of the CMB, and sensitive observations of the fine-scale anisotropy of the CMB. These allow to test the most striking extensions of the hot Big Bang model, including the hypotheses of inflation and dark energy.

After a general description of the status of the field, with a detailed description of the Planck survey and its early results, we will focus on a few new ideas, exploiting the full information encoded in ultradeep maps of CMB anisotropy and polarization. These include differential spectroscopy of secondary CMB anisotropy, and precision measurements of CMB polarization, both requiring the most advanced experimental methods and detector, space and analysis technologies.

Casolino Marco

RIKEN - Japan and INFN – Italy

Latest results on cosmic ray particles and antiparticles from PAMELA experiment

Abstract: PAMELA is a satellite-borne magnet spectrometer detector orbiting the Earth on board the Russian Resurs-DK1 satellite since 2006. It is devoted to the high precision measurements of cosmic ray particle and antiparticles of galactic, solar and terrestrial origin. In this talk we will discuss the recent measurements of electrons, positrons and antiprotons and their relevance for indirect dark matter search as well as cosmic rays production and propagation. Also data on Proton and Helium nuclei - which exhibit different spectral indexes and suggest that the two particles undergo different acceleration mechanisms or are accelerated at different sites will be presented.

Bernabei Rita

Universita' di Roma Tor Vergata

Title: *Results from DAMA/LIBRA and perspectives*

Abstract: The DAMA/LIBRA set-up (about 250 kg highly radiopure NaI(Tl)) is running at the Gran Sasso National Laboratory of the I.N.F.N.. The results obtained by exploiting the model independent annual modulation signature for the presence of Dark Matter (DM) particles in the galactic halo during the first six annual cycles (exposure of 0.87 ton x yr) will be discussed. The cumulative exposure with those previously released by the former DAMA/NaI is 1.17 ton $\times$ yr, corresponding to 13 annual cycles. The confidence level for the observed effect is 8.9 sigma and the data satisfy all the many peculiarities of this DM model independent signature. No systematics or side processes able to account for the measured modulation amplitude and to simultaneously satisfy all the many requirements of the signature have been found or suggested by anyone over more than a decade. Data have already been collected during a further annual cycle before the realization of a new upgrade of the DAMA/LIBRA set-up, which occurred at end of 2010. Presently DAMA/LIBRA is in data taking in the new configuration. Results, implications and experimental perspectives will be summarized.

Wang Lifan

Texas A&M University - NAOC

TBD

Ji Xiangdong

University of Maryland and Beijing University

Direct Dark Matter Research on Panda X project in Sichuan