Vulcano Workshop 2014 - Frontier Objects in Astrophysics and Particle Physics

Report of Contributions

https://agenda.infn.it/e/7266

Contribution ID: **0** Type: **not specified**

Direct measurements of cosmic rays in space

Friday, 23 May 2014 09:00 (25 minutes)

Direct measurements of the chemical composition and fluxes of cosmic rays have always played a crucial role in advancing our understanding of their acceleration and propagation mechanisms. Direct cosmic-ray observations are possible –with the current technologies –up to energies of about 10^14 eV. In this talk I will give an overview of the physics of cosmic rays by direct measurements, describing the characteristics of the available space platforms and mentioning the most relevant experiments existing in the field.

Primary author: SPARVOLI, Roberta (ROMA2)

Presenter: SPARVOLI, Roberta (ROMA2)

Session Classification: Cosmic Rays

Contribution ID: **1** Type: **not specified**

The hot and energetic universe with Athena

Saturday, 24 May 2014 10:15 (25 minutes)

ESA recently selected “The hot and energetic universe” as the scientific theme to be addressed by the L2 mission (launch foreseen in 2028) in the Cosmic Vision plan. In this talk the scientific theme will be presented along with the related mission concept, i.e. the large X-ray observatory Athena.

Primary author: MATT, Giorgio (Universita’ Roma Tre)

Presenter: MATT, Giorgio (Universita’ Roma Tre)

Session Classification: Future Prospects

Contribution ID: **2** Type: **not specified**

China's Programs of Astroparticle Physics in Space

Tuesday, 20 May 2014 09:00 (25 minutes)

In this talk, I will summarize China's programs of astroparticle physics in space. The approved missions are the Hard X-ray Modulation Telescope (HXMT) satellite mission for launch in 2015, the dedicated gamma-ray burst polarization expariment POLAR on China's spacelab for launch in 2015, the multiwavelength gamma-ray burst satellite mission SVOM for launch before 2020. Two missions under study and R&D will also be presented: the X-ray Timing and Polarization (XTP) observatory planned for launch around 2020 and the High Energy cosmic-Radiation Detection (HERD) facility onboard China's spacestation for launch around 2020.

Primary author: ZHANG, Shuang-Nan (Institute of High Energy Physics)

Presenter: ZHANG, Shuang-Nan (Institute of High Energy Physics)

Session Classification: Future Prospects

Contribution ID: **3** Type: **not specified**

Correlation analysis between sky maps of Tibet cosmic rays and microwave observed with WMAP and Planck

Thursday, 22 May 2014 12:40 (25 minutes)

In this talk, I will present our recent work of correlation analysis between the sky maps of cosmic rays observed from Tibet and microwave observed from WMAP and Planck. We find that sky maps of cosmic rays observed from Tibet are strongly and positively correlated with the foreground unreduced microwave sky maps of WMAP and Planck, consistent with the Galactic origin of the Tibet cosmic rays. Significant negative correlations are also found in some areas of the sky between cosmic ray maps and the foreground reduced microwave sky maps of WMAP and Planck, suggesting that the foreground reduced microwave sky maps might include some unreduced foreground contaminations.

Primary author: ZHANG, Shuang-Nan (Institute of High Energy Physics)

Presenter: ZHANG, Shuang-Nan (Institute of High Energy Physics)

Session Classification: Cosmic Ray origin, Gamma and Neutrino Astronomy

Contribution ID: **4** Type: **not specified**

LUNA: from Sun to Novae and beyond

Wednesday, 21 May 2014 11:50 (25 minutes)

LUNA started underground nuclear astrophysics more than twenty years ago in Gran Sasso. The 1400 meter thick overburden of dolomite has allowed nuclear physics experiments with very small count rate, down to a few events per month.
Thanks to this, the key reactions of the proton-proton chain and of the CNO cycle have been studied down to very low energies. As a consequence, it is now possible to use solar neutrinos to study the properties of the neutrino itself and to probe the deep interior of the Sun. The solar phase ended a few years ago. LUNA is now studying the reactions responsible for the 'cooking'of the light elements during hydrogen burning in the shell of massive stars and in Novae explosions. The main results obtained by LUNA will be discussed and future developments towards the study of helium burning briefly outlined.

Primary author: BROGGINI, Carlo (INFN-Sezione di Padova)

Presenter: BROGGINI, Carlo (INFN-Sezione di Padova)

Session Classification: Particle Physics/Interactions/Astroparticle Physics

Contribution ID: **5** Type: **not specified**

The CALET mission on the International Space Station

Friday, 23 May 2014 19:20 (15 minutes)

The CALorimetric Electron Telescope (CALET) is an experiment currently under preparation to be launched to the International Space Station (ISS), where it will be installed on the Japanese Experiment Module-Exposure Facility (JEM-EF). Its main scientific goal is to search for possible clues of the presence of astrophysical sources of high-energy electrons nearby the Earth or signatures of dark matter, by measuring accurately the electron spectrum up to several TeV. CALET will also investigate the mechanism of cosmic-ray (CR) acceleration and propagation in the Galaxy, by performing direct measurements of the energy spectra and elemental composition of CR nuclei from H to Fe up to several hundreds of TeV, and the abundance of trans-iron elements at few GeV/amu up to about Z=40. The instrument consists of two layers of segmented plastic scintillators to identify the particle charge, a thin (3 radiation lengths) tungsten-scintillating fiber calorimeter providing accurate particle tracking and imaging the initial development of the showers, and a thick (27 radiation lengths) calorimeter made of lead-tungstate crystal logs, to measure the energy of CRs with excellent resolution and electron/hadron separation up to the multi-TeV scale.
In this paper, we will review the status of the CALET mission, the instrument configuration and its performance, the results from prototype beam tests at CERN SPS, and the expected measurements of the different components of the cosmic radiation in 5 years of observations.

Primary author: MAESTRO, Paolo (SI)

Presenter: MAESTRO, Paolo (SI)

Session Classification: Cosmic Rays

Contribution ID: **6** Type: **not specified**

Missing Baryons at all Astronomical Scales: current evidence and future prospects

Monday, 19 May 2014 10:15 (25 minutes)

Baryons are missing at all astronomical scales in the Universe, from galaxies to the large scales of structure formation and the Universe as a whole. Hydro-dynamical simulations for the formation of structures, tend to re-concile the different “missing-baryon” problems and predict that most of the baryonic matter of the Universe is hiding in a hot and tenuous gaseous phase, surrounding virialized structures and more at large in the low-redshift inter-galactic space.
Here I will first summarize the current state of the art and show the current evidence of such matter in the local Universe, and will then focus on the short- and long-term future prospects for such a rich and still relatively unexplored field of research.

Primary author: NICASTRO, Fabrizio (INAF - OAR)

Presenter: NICASTRO, Fabrizio (INAF - OAR)

Session Classification: Astrophysics/Cosmology

Contribution ID: **7** Type: **not specified**

BBN, Neutrinos and Nuclear Astrophysics

Monday, 19 May 2014 11:25 (25 minutes)

Big Bang Nucleosynthesis (BBN) theory describes the formation of light isotopes in the first minutes of cosmic time. Their abundance only depends on the baryon density, on particle physics and on nuclear astrophysics, through the competition between the universal expansion rate and the yields of the relevant nuclear reactions. The baryon density [1,2] and the observed abundance of light isotopes [3,4] are presently known with high accuracy, making the knowledge of BBN nuclear processes a major source of uncertainty to compute the primordial nuclide abundances. As the expansion rate depends on the number of active neutrino families (and any other relativistic species), the comparison between computed and observed abundances of light isotopes allows to constrain the existence of "dark radiation", i.e. sterile neutrinos or any relativistic species beyond those known (in Standard Model, photons and three neutrino families). Presently, the BBN theory constraints the number of neutrino families in excellent agreement with the complementary results from the Cosmic Microwave Background (CMB) experiments, providing a suggestive, but still inconclusive, hint of the presence of dark radiation.
In this presentation, it will be shown that a renewed study of few key reactions of the BBN chain, possibly with the existing LUNA accelerator or with proposed underground facilities, is essential to improve the accuracy of computed abundances of light isotopes, providing the BBN theory a powerful probe of physics beyond the Standard Model [7]. In particular, the accurate measurement of the D(p,γ)3He reaction at BBN energies (50-500 keV), allows to substantially improve the constraints on the number of neutrinos species and/or on the lepton degeneracy in the neutrino sector [7,8].

REFERENCES:
[1] WMAP collaboration: arXiv:1212.5225v3 [astro-ph.CO] 4 Jun 2013.
[2] PLANCK collaboration: arXiv:1303.5076v1 [astro-ph.CO] 20 Mar 2013.
[3] M. Pettini and R. Cooke: Mon. Not. R. Astron. Soc. 425, 24772486 (2012).
[4] See proceedings of "Lithium in the Cosmos", 27-29 February 2012, Paris.
[5] Angulo C et al 1999 Nucl. Phys. A656 3.
[6] See proceedings of "Nuclear Physics in Astrophysics VI", 19-24 May 2013, Lisbon.
[7] G. Steigman: arXiv:1208.0032v1 [hep-ph] 31 Jul 2012.
[8] K.M. Nollett and G.P. Holder: arXiv:1112.2683v1 [astro-ph.CO] 12 Dec 2011.

Primary author: GUSTAVINO, Carlo (INFN-Rome)

Presenter: GUSTAVINO, Carlo (INFN-Rome)

Session Classification: Astrophysics/Cosmology

Contribution ID: **8** Type: **not specified**

Neutrino observations with IceCube

Thursday, 22 May 2014 17:25 (25 minutes)

The IceCube Neutrino Observatory instruments a cubic kilometer of the Antarctic ice at the South Pole with a three-dimensional grid of light sensors in combination with a square kilometer surface array. The observatory was completed at the end of 2010, but the partially instrumented detector has been taking data since 2006. Several breakthroughs in the field have been accomplished, in particular the first evidence of a flux of high energy neutrinos of extraterrestrial origin and the unexpected lack of a significant signal in relation with Gamma Ray Bursts. We will discuss these results in detail and also cover other recent results such as the observation of atmospheric neutrino oscillations, the latest point source analysis, indirect dark matter searches and future proposed upgrades of the detector.

Primary author: GOLUP, Geraldina (IIHE- Vrije Universiteit Brussel)

Co-author: THE ICECUBE COLLABORATION, - (-)

Presenter: GOLUP, Geraldina (IIHE- Vrije Universiteit Brussel)

Session Classification: Neutrino

Contribution ID: **9** Type: **not specified**

Open Problems in Gravitational Physics

Monday, 19 May 2014 12:15 (25 minutes)

Extended gravity models have recently attracted a lot of interest as alternative candidates to explain the observed cosmic acceleration, the flatness of the rotation curves of spiral galaxies, the gravitational potential of galaxy clusters, and other relevant astrophysical phenomena. Very likely, what we call "dark matter"and "dark energy"are nothing else but signals of the breakdown of General Relativity at large scales and could be interpreted as a sort of "curvature effect". Furthermore, PPN-parameters deduced from Solar System experiments and strong field astrophysical phenomena (compact objects, magnetars and neutron stars) do not exclude the possibility that such theories could give other observable effects. We review these results discussing open problems in gravitational physics.

Primary author: CAPOZZIELLO, Salvatore (Università di Napoli "Federico II")

Presenter: CAPOZZIELLO, Salvatore (Università di Napoli "Federico II")

Session Classification: Astrophysics/Gravitational Waves and Gravity

Contribution ID: **10** Type: **not specified**

Results from the PAMELA space experiment

Friday, 23 May 2014 09:25 (25 minutes)

Launched on 15th June 2006, the PAMELA apparatus is still collecting data more than doubling the expected life time. A review of the most significant results obtained by PAMELA will be presented with particular emphasis on the precision of the measurements addressing the issue of systematic and statistical errors. Moreover, results about the ongoing analyses about solar modulation and solar flares will be discussed.

Primary author: MOCCHIUTTI, Emiliano (TS)

Presenter: MOCCHIUTTI, Emiliano (TS)

Session Classification: Cosmic Rays

Contribution ID: **11** Type: **not specified**

The TeV Cosmic-Ray Anisotropy from Local Dark Matter Annihilation

Wednesday, 21 May 2014 12:15 (25 minutes)

Several experiments including Milagro, IceCube, and HAWC have reported regions in the TeV sky with an excess of cosmic rays above the expected isotropic background. I will discuss the consistency of these cosmic-ray excesses with dark matter annihilations in a nearby subhalo. The dark matter explanation of the TeV cosmic-ray excess naturally explains both the spatial and spectral features of the TeV anisotropy. The dark matter annihilation rate and annihilation channels which explain the anisotropy also naturally explain the observed gamma-ray excess in the Galactic center as observed by HESS. I will demonstrate that the dark matter annihilation rate needed to produce the excess is consistent with current measurements of antiprotons, positrons, neutrinos, and gamma-rays. Additionally, I will discuss the predicted signatures from the dark matter subhalo in several cosmic-ray channels, several of which are measurable by the next generation of experiments.

Primary author: HARDING, J. Patrick (Los Alamos National Laboratory)

Presenter: HARDING, J. Patrick (Los Alamos National Laboratory)

Session Classification: Particle Physics/Interactions/Astroparticle Physics

Contribution ID: **12** Type: **not specified**

Status of neutrino oscillations and sterile neutrinos

Thursday, 22 May 2014 19:05 (25 minutes)

I review the experimental indications in favor of short-baseline neutrino oscillations. I discuss their interpretation in the framework of neutrino mixing schemes with one or more sterile neutrinos which have masses around the eV scale. Taking into account also cosmological constraints, I present arguments in favor of 3+1 neutrino mixing with one sterile neutrino at the eV scale.

Primary author: GIUNTI, Carlo (INFN)

Presenter: GIUNTI, Carlo (INFN)

Session Classification: Neutrino

Contribution ID: **13** Type: **not specified**

The MAGIC legacy to next generation of IACTs: results and prospects

Thursday, 22 May 2014 11:50 (25 minutes)

The present generation of Imaging Air Cherenkov Telescopes (IACTs) has greatly improved our knowledge on the Very High Energy side of our Universe. The MAGIC IACTs operate since 2004 with one telescope and since 2009 as a two telescope stereoscopic system. I will outline a few of our latest and most relevant results: the surprising gamma-ray factory in the Perseus galaxy cluster with emission from NGC1275 and the puzzling emission of IC310; the advances on the identification of the location of emission region in jets of AGNs; the discovery of pulsed emission from the Crab pulsar at VHE, recently found to extend up to 400 GeV and along the "bridge" of the light curve. Non detections and corresponding upper limits also provide an useful insight into the physics of the observed objects and into fundamental topics such as the Intergalactic Magnetic Field and emission from Dark Matter candidates. The results that will be described here and the planned deep observations in the next years will serve as a sound cornerstone for the future of VHE Astrophysics.

Primary authors: STAMERRA, Antonio (TO); CORTINA, Juan (IFAE)

Presenter: CORTINA, Juan (IFAE)

Session Classification: Cosmic Ray origin, Gamma and Neutrino Astronomy

Contribution ID: **14** Type: **not specified**

High energy atmospheric physics and Terrestrial Gamma-ray Flashes

Friday, 23 May 2014 18:30 (25 minutes)

Thunderstorms have been recently established as the most energetic natural particle accelerators on Earth. Starting from the early work by Wilson in 1925 suggesting the acceleration of electrons up to relativistic energies in thunderstorm electric fields, it took about 75 years to build up a sufficiently large observational frame and reach a general consensus on the existence of this phenomenon. The most violent manifestations of this process are Terrestrial Gamma-ray Flashes, sub-millisecond bursts of gamma-rays with energy up to several tens of MeV produced in thunderstorms and typically detected from space by detectors designed for high-energy astrophysics. First discovered in 1994 by the BATSE instrument onboard the NASA CGRO spacecraft, TGFs are now entering a golden age thanks to the wealth of observations delivered by the AGILE, RHESSI and Fermi satellites. Despite a general consensus on the underlying physical mechanism, several questions are still open, namely on the TGF-lightning relation, the maximal energy, and the pervasiveness of the phenomenon. In addition to TGFs observed from space, impulsive bursts of radiation as well as long-lasting emissions have been observed by detectors onboard research airplanes and deployed on ground, suggesting that the production of energetic radiation within thunderstorms is a much more pervasive phenomenon than previously thought. In this presentation I will review the state of this rapidly-growing field, focusing on the most recent results and the forthcoming observational programs.

Primary author: MARISALDI, Martino (INAF-IASF Bologna)

Presenter: MARISALDI, Martino (INAF-IASF Bologna)

Session Classification: Cosmic Rays

Contribution ID: **15** Type: **not specified**

Are IceCube PeV neutrino events extraterrestrial or can be of atmospheric origin?

Thursday, 22 May 2014 19:30 (25 minutes)

Cascade showers with near PeV energies observed in the IceCube experiment in near horizontal direction gave a powerful pulse to discussions of their possible generation by extraterrestrial neutrinos. The reason is very simple. The expected neutrino flux of atmospheric origin is very small to produce such events. But if to take into account a possibility of production of a new state of matter in nucleus-nucleus interactions of cosmic rays with energy about 1016 eV and higher, the picture can be changed drastically. As calculations show, in this case muon and neutrino spectra will be much harder than usual atmospheric ones and can explain the appearance of such cascade showers. Muon energy spectrum measured in BUST and IceCube experiments at energies higher than 100 TeV showed the considerable excess of the measured number of muons in comparison with calculations based on a traditional approach. In this case, the observed IceCube events can be generated by neutrinos of atmospheric origin, and their detection evidences in favour of the production of the new state of matter at very high energies.

Primary author: PETRUKHIN, Anatoly (MEPhI)

Presenter: PETRUKHIN, Anatoly (MEPhI)

Session Classification: Neutrino

Contribution ID: **16** Type: **not specified**

AERA –The Auger Engineering Radio Array

Friday, 23 May 2014 19:35 (15 minutes)

Extensive air showers originating from ultra-high energy cosmic rays exhibit emission of electromagnetic signals in the radio frequency range. In comparison with other detection techniques, radio measurements deliver complementary information on the electromagnetic shower component with a duty cycle close to 100%. The Auger Engineering Radio Array (AERA) is located within the Pierre Auger Observatory in Argentina which is the world's largest detector for cosmic rays. It offers a well calibrated environment to test and develop future detector technologies and therefore is an optimal location for AERA. Currently, AERA constitutes the largest radio cosmic ray setup consisting of 124 autonomous radio stations and covering an area of approximately 6 km^2. Since 2011 continuous data taking has started with several thousand cosmic ray events recorded so far. In measurements of air showers simultaneously with radio, fluorescence light and particle detectors, the sensitivity of the radio detection to cosmic ray properties such as arrival direction, energy and mass is being investigated. In this talk the status of AERA will be presented as well as actual results concerning data analysis of radio signatures with AERA.

Primary author: KRAUSE, Raphael (for the Auger Collaboration)

Presenter: KRAUSE, Raphael (for the Auger Collaboration)

Session Classification: Cosmic Rays

Contribution ID: **17** Type: **not specified**

Large-Scale Distribution of Arrival Directions of Cosmic Rays Detected at the Pierre Auger Observatory Above 10 PeV

Friday, 23 May 2014 12:55 (25 minutes)

Searches for large-scale anisotropies in the distribution of arrival directions of cosmic rays detected above about 10 PeV at the Pierre Auger Observatory are presented. Although no significant deviation from isotropy is revealed at present, some of the measurements suggest that future data will provide hints for large-scale anisotropies over a wide energy range. Those anisotropies would have amplitudes which are too small to be significantly observed within the current statistics. Assuming that the cosmic ray anisotropy is dominated by dipole and quadrupole moments in the EeV-energy range, some consequences of the present upper limits on their amplitudes are presented.

Primary author: BONINO, Raffaella (Università di Torino and INFN)

Presenter: BONINO, Raffaella (Università di Torino and INFN)

Session Classification: Cosmic Rays

Contribution ID: **18** Type: **not specified**

Precision tests of General Relativity and Gravitation by Lunar Laser Ranging

Monday, 19 May 2014 17:25 (25 minutes)

Lunar Laser Ranging (LLR) to the Apollo retroreflectors on moon over the past four decades has provided some of the best experimental tests of Gravitation and General Relativity. The history and technology of the Lunar Laser Ranging Retroreflectors (LLRR) deployed during the Apollo 11, 14 and 15 missions and the ranging program will be briefly described. The results of the LLRR program have produced some of the best validations of the theory of General Relativity and of the properties of Gravity. The discovery of Dark Energy has stimulated the development of a new set of alternate theories that modify or replace General Relativity. On the other hand, the LLR results evaluating the limits on the violation of the Strong Equivalence Principle and the change of the Gravitational Constant with Time and Space, for example, provide powerful constraints on these various new theories. Further, when combined with the results of other experiments, strong limits on some of the fundamental ideas in cosmology are achieved.
While the Apollo retroreflectors are still operating, over the past four decades the technologies deployed on the lunar laser ranging ground stations have improved the ranging accuracy for a single photo-electron by more than a factor of 200. Thus the retroreflector arrays deployed during the Apollo missions now limit the single photo-electron range accuracy. The new results for General Relativity and Gravitation that could be accomplished by a next generation retroreflector that supports 1 mm ranging will be described.

Primary author: CURRIE, Douglas (University of Maryland, College Park)

Co-authors: Dr BEHR, Bradford (University of Maryland, College Park); Dr DELLE MONACHE, Giovanni (Istituto Nazionale di Fisica Nucleare Laboratori Nazionali di Frascati); DELL'AGNELLO, Simone (LNF)

Presenter: CURRIE, Douglas (University of Maryland, College Park)

Session Classification: Astrophysics/Gravitational Waves and Gravity

Contribution ID: **19** Type: **not specified**

GRB observations with Fermi

Thursday, 22 May 2014 11:00 (25 minutes)

After almost 6 years of science operation, the Large Area Telescope (LAT) onboard the Fermi Gamma-Ray Space Telescope has detected more than 70 Gamma-Ray Bursts above 30 MeV. We will give an overview of these observations, focusing on the recently published first LAT GRB catalog (based on the first 3 years of operation), and presenting the common properties in the GRB temporal and spectral behavior at high energies. We will also highlight the unique characteristics of some individual bursts. The main physical implications of these results will be discussed, along with open questions regarding GRB modelling in their prompt and temporally-extended emission phases.

Primary author: LONGO, Francesco (TS)

Presenter: LONGO, Francesco (TS)

Session Classification: Cosmic Ray origin, Gamma and Neutrino Astronomy

Contribution ID: **20** Type: **not specified**

New DAMA/LIBRA results

Tuesday, 20 May 2014 11:00 (25 minutes)

The final model independent results from the DAMA/LIBRA-phase1 experiment, recently released, will be discussed. Implications and comparisons will be addressed. Other results as well as DAMA/LIBRA-phase2 will be introduced.

Summary

The former DAMA/NaI set-up (about 100 kg fully sensitive highly radiopure NaI(Tl)) and the second generation DAMA/LIBRA-phase1 one (about 250 kg fully sensitive highly radiopure NaI(Tl)) have cumulatively obtained a 9.3 sigma C.L. positive result
of the presence of Dark Matter (DM) particles in the galactic halo by exploiting the model independent DM annual modulation signature. The data satisfy all the many requirements of this signature. No systematics or side reactions able to mimic such a signature have been found or suggested by anyone over more than a decade. Several kinds of analyses will be discussed and information about the new configuration DAMA/LIBRA-phase2 (where PMTs with higher quantum efficiency are used) will be given. Implications, comparisons and experimental perspectives will be addressed.

Primary author: BERNABEI, Rita (Physics dept. . Rome Tor Vergata University)

Presenter: BERNABEI, Rita (Physics dept. . Rome Tor Vergata University)

Session Classification: Dark Matter

Contribution ID: **21** Type: **not specified**

Indirect Searches for Dark Matter with the Fermi Large Area Telescope

Tuesday, 20 May 2014 12:15 (25 minutes)

There is overwhelming evidence that non-baryonic dark matter constitutes ~27% of the energy density of the universe. Weakly Interacting Massive Particles (WIMPs) are promising dark matter candidates that may produce gamma rays via annihilation or decay detectable by the Fermi Large Area Telescope (Fermi LAT). A detection of WIMPs would also indicate the existence of physics beyond the Standard Model. I will present results from a variety of recent indirect WIMP searches by the Fermi LAT Collaboration, including our two "cleanest" searches: spectral lines and dwarf spheroidal galaxies.

Primary author: ALBERT, Andrea (SLAC National Accelerator Laboratory)

Presenter: ALBERT, Andrea (SLAC National Accelerator Laboratory)

Session Classification: Dark Matter

Contribution ID: **22** Type: **not specified**

The eve of multimessenger astronomy

Monday, 19 May 2014 09:00 (25 minutes)

Until now, most of the objects in the sky have been studied using solely electromagnetic radiation. Cosmic rays have been detected for more than a century, and their origin(s) is still under debate. Several instruments are in operation or close to completion to study astrophysical sources by non-photonic means, i.e. neutrinos and gravitational waves. This can be considered as the opening of an entire new field, coined « multimessenger astronomy », where both the photonic and the non-photonic data is used to gather information on the Universe and its content.
In this review we will present the processes and objects that can be sources of non-photonic radiation. We will briefly summarize how and with which experiment they can be detected. We will show how the combination of the data provided by the different « messengers » can cast a new light on the physics and on the fundamental mechanisms at play.

Primary author: BOER, Michel (CNRS-ARTEMIS)

Presenter: BOER, Michel (CNRS-ARTEMIS)

Session Classification: Astrophysics/Cosmology

Contribution ID: **23** Type: **not specified**

Gravitational Waves: the new tool to look at the hidden side of the Universe

The search for detection of gravitational waves has lasted for more than 40 years and it has seen enormous progress in terms of sensitivity of the detectors setting upper limits on the flux of gravitational waves with interesting astrophysics consequences.
At present we are confident that the network of advanced detectors, being developed in three different continents, will open the era of the Gravitational wave astronomy.
In this talk, after a brief historical introduction, we will discuss results of astrophysical interest already obtained and will discuss the prospects for the direct detection.
Conclude by discussing briefly the future perspectives of these detectors.

Primary author: RICCI, Fulvio (ROMA1)

Presenter: RICCI, Fulvio (ROMA1)

Contribution ID: **25** Type: **not specified**

UHECR and GRB Neutrinos : incomplete revolutions ?

Friday, 23 May 2014 17:00 (25 minutes)

UHECR have been foreseen to trace nearby SuperGalactic Plane. Moreover
UHECR have been expected to suffer by cosmic photon interaction of a consequent opacity, leading to a EeV neutrino secondary trace (GZK neutrinos). On the other side GRBs have been expected to produce in Fireball TeV-PeV neutrino burst at the same time of GRBs. Both of these three signature are missing.

Summary

After a century The Cosmic ray puzzles are becoming more and more surprising. Last decade and last year by UHECR maps, composition and spectra as well as ICECUBE PeV neutrino signals let to an unexpected revolution that did not fit any theoretical naive expectations.

Primary author: FARAGION, Daniele (Phys Depart and INFN rome SAPIENZA)

Presenter: FARAGION, Daniele (Phys Depart and INFN rome SAPIENZA)

Session Classification: Cosmic Rays

Contribution ID: **26** Type: **not specified**

Dark matter signals from the Inner Galaxy?

Tuesday, 20 May 2014 17:50 (25 minutes)

Recent indirect dark matter searches with gamma rays have yielded several tantalizing hints of dark matter signals from the Inner Galaxy, however a confident detection remains elusive. I will discuss these recent results and possible alternatives to the dark matter interpretation of the claimed signals, as well as new approaches and prospects for robustly identifying a dark matter signal from the Inner Galaxy with future experiments.

Primary author: SIEGAL-GASKINS, Jennifer (Caltech)

Presenter: SIEGAL-GASKINS, Jennifer (Caltech)

Session Classification: Dark Matter

Contribution ID: **27** Type: **not specified**

Crab observations with AGILE

Thursday, 22 May 2014 10:15 (25 minutes)

The surprising discovery by the AGILE satellite of variable gamma-ray emission above 100 MeV from the Crab Nebula in Sept. 2010 started a new era of investigation of the Crab system, and won to the AGILE PI and the AGILE Team the Bruno Rossi Prize for 2012.
Astronomers have long believed the Crab to be an almost ideal standard candle, a nearly constant source at a level of few percent, from optical to gamma-ray energies. I will summarize recent results on the ground-breaking AGILE discovery of strong and rapid gamma-ray flares from the Crab Nebula over daily timescales, also confirmed by the Fermi NASA Observatory.
AGILE is an Italian Space Agency (ASI) space mission, built and operated in cooperation with INAF, INFN and CIFS, dedicated to the observation of the gamma-ray Universe in the 30 MeV - 50 GeV energy range, with simultaneous X-ray imaging capability, currently in orbit since April 23rd, 2007.

Primary author: PITTORI, Carlotta (INAF-OAR/ASDC)

Presenter: PITTORI, Carlotta (INAF-OAR/ASDC)

Session Classification: Cosmic Ray origin, Gamma and Neutrino Astronomy

Contribution ID: **28** Type: **not specified**

Direct Search for Dark Matter with Two-phase Xenon Detectors: Current Status of LUX and Plans for LZ

Tuesday, 20 May 2014 11:25 (25 minutes)

The search for dark matter reaches back generations and remains one of the most compelling endeavors in the hunt for physics beyond the Standard Model. Experiments attempting to directly detect weakly interacting massive particle (WIMP) dark matter have made remarkable progress in increasing their sensitivity to the elastic scattering of WIMPs on nuclei. The Large Underground Xenon (LUX) experiment is a 370-kg, two-phase, xenon time projection chamber currently running at the Sanford Underground Research Facility (SURF), 4850 feet below Lead, SD. LUX recently completed its first science run (in the fall of 2013) and was sensitive to spin independent WIMP scattering at cross sections below 1e-45 square centimeters for WIMP masses of approximately 20 to 80 GeV. Preparations for the final science run of LUX are currently underway, with final results expected in 2015. Successful operation of the LUX detector is also an important milestone in the use of technologies (such as water shielding and thermosyphon cryogenics) proposed for even larger detectors. We will present results from and current status of the LUX experiment, as well as plans for a follow-on, multi-ton-scale xenon experiment at SURF.

Primary author: GEHMAN, Victor (Lawrence Berkeley National Laboratory)

Presenter: GEHMAN, Victor (Lawrence Berkeley National Laboratory)

Session Classification: Dark Matter

Contribution ID: **29** Type: **not specified**

Observational prospects in the electromagnetic domain of the gravitational wave sources

Monday, 19 May 2014 17:00 (25 minutes)

A new exciting frontier of observational astronomy will soon start to be explored: the current upgrade of gravitational wave ground-based detectors, LIGO and Virgo, should make possible to observe gravitational wave signals for the first time. Expected sources of gravitational waves include the most energetic astrophysical events such as the merger of neutron stars and/or black holes and the core collapse of massive stars. These events are believed to produce the electromagnetic transients, like the gamma-ray bursts and supernovae. The simultaneous use of electromagnetic facilities and gravitational-wave detectors will give the unique opportunity to catch the electromagnetic signature of the gravitational wave source and to observe the same source with different messengers (GW and photons). Challenges, opportunities and strategies to develop and carry on rapid follow-up electromagnetic observations of gravitational wave candidate events will be outlined.

Primary author: BRANCHESI, Marica (Università di Urbino/INFN-Firenze)

Presenter: BRANCHESI, Marica (Università di Urbino/INFN-Firenze)

Session Classification: Astrophysics/Gravitational Waves and Gravity

Contribution ID: **30** Type: **not specified**

Warm Dark Matter vs. Cold Dark Matter Scenarios for the Formation of Cosmic Structures

Tuesday, 20 May 2014 17:25 (25 minutes)

I will review the present astronomical evidences for Dark Matter, enlightening their implications for the nature of the Dark Matter components. In particular I will review some critical aspects of the current Cold Dark Matter model concerning the formation and evolution of cosmic structures, and show the impact of assuming lighter Dark Matter particles (Warm Dark Matter) on the statistical properties of galaxies and Active Galactic Nuclei.

Primary author: MENCI, Nicola (INAF - Osservatorio Astronomico di Roma)

Presenter: MENCI, Nicola (INAF - Osservatorio Astronomico di Roma)

Session Classification: Dark Matter

Contribution ID: **31** Type: **not specified**

Fundamental physics with space and ground atomic quantum sensors

Monday, 19 May 2014 18:15 (25 minutes)

Matter-wave interferometry has recently led to the development of new techniques for the measurement of inertial forces, with important applications both in fundamental physics and applied research. The remarkable stability and accuracy that atom interferometers have reached for acceleration measurements can play a crucial role for science and technology. Quantum sensors based on atom interferometry had a rapid development during the last two decades and different measurement schemes were demonstrated and implemented. Atom interferometry is used for precise measurements of the gravitational acceleration, Earths gravity gradient, and rotations. Experiments on the validity of the equivalence principle and on the measurement of the gravitational constant G have been performed, while tests of general relativity and of Newton's 1/r^2 law as well as the detection of gravitational waves have been proposed. Accelerometers based on atom interferometry have been developed for many practical applications including metrology, geodesy, geophysics, engineering prospecting and inertial navigation. Ongoing studies show that the space environment will allow us to take full advantage of the potential sensitivity of atom interferometers. The talk will give on overview of state of the art and future prospects of atom interferometry sensors on ground and in space.

Primary author: SORRENTINO, Fiodor (FI)

Presenter: SORRENTINO, Fiodor (FI)

Session Classification: Astrophysics/Gravitational Waves and Gravity

Contribution ID: **33** Type: **not specified**

Cosmic Rays at Ultra High Energies

Friday, 23 May 2014 11:15 (25 minutes)

We will review Ultra High Energy Cosmic Rays (UHECR) observations discussing theoretical implications on the possible sources. The latest Auger and Telescope Array observations will be presented in the framework of a general theoretical approach to production and propagation of UHECR.

Primary author: ALOISIO, Roberto (GSSI)

Presenters: GRILLO, Aurelio (LNGS); ALOISIO, Roberto (GSSI)

Session Classification: Cosmic Rays

Contribution ID: **35** Type: **not specified**

New avenues in cosmic ray research

I will review some recent developments in the investigation of acceleration and propagation of cosmic rays and their implications for the transition from Galactic to extragalactic cosmic rays

Primary author: BLASI, Pasquale Blasi (INAF/Osservatorio Astrofisico di Arcetri)

Presenter: BLASI, Pasquale Blasi (INAF/Osservatorio Astrofisico di Arcetri)

Contribution ID: **36** Type: **not specified**

High-energy Gamma Rays detection with the AMS-02 electromagnetic calorimeter

Friday, 23 May 2014 18:15 (15 minutes)

The Alpha Magnetic Spectrometer (AMS-02) is a high-energy particle detector developed to operate on the International Space Station. It was installed and started taking data on May 2011, and is expected to operate for 10-20 years, collecting about 160-320 billion events. The main goals of the experiment are the detection of primordial antimatter and of dark matter, by studying spectra and fluxes of different cosmic ray components in the high energy range (1-2000 GeV).
Identification of electrons, positrons and photons is provided by the Electromagnetic Calorimeter (ECAL), a fine-grained lead-scintillating fibre sampling calorimeter that allows for a precise three-dimensional imaging of the longitudinal and lateral shower development. The ECAL provides an excellent reconstruction of the electromagnetic shower energy and a highly efficient rejection of the hadronic background.
Thanks to the 3D shower reconstruction capability, ECAL allows a stand-alone determination of the incoming particle direction, with unprecedented angular resolution. The AMS-02 subdetectors located above the ECAL provide rejection of charged background. As a result, ECAL is able to identify high energy photons coming from galactic and extragalactic sources. The up-to-date AMS-02 photon data will be discussed.

Primary author: PILO, Federico (PI)

Presenter: PILO, Federico (PI)

Session Classification: Cosmic Rays

Contribution ID: **37** Type: **not specified**

The Higgs and the excessive success of the SM

Wednesday, 21 May 2014 09:50 (25 minutes)

I will review the status of particle physics after the LHC runs at 7-8 TeV

Primary author: ALTARELLI, Guido (Universita' di Roma Tre/CERN)

Presenter: ALTARELLI, Guido (Universita' di Roma Tre/CERN)

Session Classification: Particle Physics/Interactions/Astroparticle Physics

Contribution ID: **38** Type: **not specified**

Galaxy clusters as cosmological probe: from X-ray observables to the total mass

Monday, 19 May 2014 09:25 (25 minutes)

The key tool to use galaxy clusters as astrophysical laboratories and cosmological probes is the knowledge of the distribution of the their gravitating and baryonic mass.
I'll discuss some of the limitations affecting the X-ray reconstruction of the gas and total mass profiles. I'll illustrate how the estimates of the gas mass fraction and of the mass concentration can be used as robust cosmological tests. I'll show how the use of generalized X-ray scaling relations can help to reduce the scatter in reconstructing the total mass. I'll present some applications of the order statistical analysis on the galaxy cluster mass and redshift distribution to probe the theoretical framework of the structure formation.

Primary author: ETTORI, Stefano (INAF OA Bologna)

Presenter: ETTORI, Stefano (INAF OA Bologna)

Session Classification: Astrophysics/Cosmology

Contribution ID: **39** Type: **not specified**

Dark matter searches with the Cherenkov Telescope Array

Tuesday, 20 May 2014 18:15 (20 minutes)

Dark matter searches with the Cherenkov Telescope Array

Christian Farnier (Oskar Klein Centre - Stokckholm University) for the CTA Consortium

The current paradigm of the Universe states that more than 80% of its mass content consists of dark matter of unknown origin. Since its discovery more than eighty years ago, the quest for dark matter identification is one of the most important questions in physics. Strongly motivated candidates in form of weakly interactive massive particles could give rise to detectable signatures in gamma rays. The Cherenkov Telescope Array, the next generation of imaging atmospheric Cherenkov telescopes, will possess incomparable sensitivity to gamma-ray signal from few tens of GeV to few hundreds of TeV rendering possible to test a wide range a dark matter scenarios. In this presentation, I will review CTA prospects to detect dark matter from different target observations, including the galactic centre, dwarf galaxies and galaxy clusters.

Primary author: FARNIER, Christian (Oskar Klein Centre - Stockholm University)

Presenter: FARNIER, Christian (Oskar Klein Centre - Stockholm University)

Session Classification: Dark Matter

Contribution ID: **41** Type: **not specified**

Are cosmic rays still a valuable probe of Lorentz Invariance Violations in the Auger era?

Friday, 23 May 2014 17:25 (25 minutes)

The detection of Ultra High Energy Cosmic Rays (UHECRs) allows the study of fundamental physics such as possible modifications of Lorentz Invariance at extreme boosts. I review the constraints of LIVs in the Cosmic Ray sector in the light of the high quality experimental data on UHECRs presently available.

Primary author: AURELIO, Grillo (LNGS)

Presenter: GRILLO, Aurelio (LNGS-INFN)

Session Classification: Cosmic Rays

Contribution ID: **42** Type: **not specified**

High energy cosmic ray anisotropy

Friday, 23 May 2014 10:30 (25 minutes)

The study of cosmic ray anisotropy could provide clues about the origin and propagation of cosmic rays in our galactic neighborhood. Because the observed anisotropy is very small, below the permille level, large event volumes are needed in order to characterize it in sufficient detail. Over the last six years, the IceCube Observatory has collected 150 billion cosmic ray induced muon events. This large data sample made it possible to detect anisotropies in the southern hemisphere, down to the 10^-5 level, at primary energies in excess of 10 TeV. The observed anisotropy is not a simple dipole, but it can be described as composed of multipole components of the spherical harmonic expansion, to about 10 degrees. A change in topological structure of the cosmic ray arrival distribution is observed above 100 TeV. Data collected with the air shower array IceTop above 300 TeV confirm the observations up to the PeV energy scale. Moreover, the addition of data collected with the AMANDA neutrino telescope, which operated between 2000 and 2007, has enabled us to search for time variability in the observed TeV anisotropy. I will discuss IceCube in the context of other observations at different energy scales.

Primary author: DESIATI, Paolo (University of Wisconsin - Madison)

Presenter: DESIATI, Paolo (University of Wisconsin - Madison)

Session Classification: Cosmic Rays

Contribution ID: **43** Type: **not specified**

The GAMMA-400 mission

Friday, 23 May 2014 18:55 (25 minutes)

GAMMA-400 is a new space mission scheduled to be launched at the end of the current decade on-board the Russian space platform Navigator. The experimental apparatus is designed for simultaneous detection of gamma and cosmic rays in a broad energy range: 100 MeV –3 TeV for photons, 1 GeV –20 TeV for electrons and positrons, and up to 10^15 –10^16 eV for p and He.
The characteristics of the instrument are optimized to address some of the most impelling science topics, such as search for signatures of dark matter, studies of Galactic and extragalactic gamma-ray sources, Galactic and extragalactic diffuse emission, gamma-ray bursts, as well as high-precision measurements of the spectra of cosmic-ray electrons + positrons and nuclei.

Primary author: BONVICINI, Valter (INFN - Trieste)

Presenter: BONVICINI, Valter (INFN - Trieste)

Session Classification: Cosmic Rays

Contribution ID: **44** Type: **not specified**

Future of space astronomy: the end of the dark ages?

Saturday, 24 May 2014 11:00 (25 minutes)

The COSPAR President on April 20, 2010 appointed the "Future of Space Astronomy"Working Group under the aegis of Commission E, with the aim to analyze the difficult situation of space astronomy over the next two decades and recommend ways to improve the prospects.
Having assessed the scientific needs and the current plans of the main space agencies worldwide, the WG initially identified some major concerns about the lack of a secured future for Space Astronomy.

Two years after the publication of the COSPAR WG results and road map the outlook for the next 20 years is less negative while a number of important astrophysical programs are now secured. Among them the L1 and L2 ESA "Large"satellites and the NASA JWST, complemented by several "medium"and small size world-class missions.

Very recently, a new endeavor is started between ESA and the Chinese Academy of Science (CAS) to realize in partnership a "joint scientific space mission".

The history of space astronomy, especially the past three decades, has demonstrated clearly the importance and benefits of access to the Gamma-ray, X-ray, UV-optical, near IR and far-IR spectrum from space.
A review of the actual panorama and an update of the COSPAR WG conclusions will be presented.

Primary author: UBERTINI, Pietro (IAPS-INAF)

Presenter: UBERTINI, Pietro (IAPS-INAF)

Session Classification: Future Prospects

Contribution ID: **45** Type: **not specified**

Detection techniques for neutrinos and high energy astrophysics

Thursday, 22 May 2014 17:00 (25 minutes)

In these last decade two researches at the frontiers of the particle physics and high energy astrophysics are unexpectedly moving along the cutting edge of the same detector technology. At one side precision the experiments on the direct search for absolute neutrino mass as well as detection of relic neutrinos or the search for its magnetic moment, at the other side the searches for hottest large scale gas structure of the universe and the most energetic processes in the neighbourhood of the black holes. Those investigations with a widespread effort from different communities are now connected by the same detector technology: the low temperature detectors.
These are arrays of small superconducting sensors (TES) that operated at about 0.1K as microcalorimeters can detect heat pulses from nuclear decays as well as x-ray absorption. The impressive spectral performance of about 1 eV at 3 KeV, the very low threshold and the large choice of sensing material make them unique detector for the next neutrino precision experiments and the next large mission in astro-physics.

Primary author: GATTI, Flavio (GE)

Presenter: GATTI, Flavio (GE)

Session Classification: Neutrino

Contribution ID: **46** Type: **not specified**

Flaring Gamma-ray AGNs

Thursday, 22 May 2014 12:15 (25 minutes)

Variability at all wavelengths, from radio to gamma-ray energies, and at timescales from minutes to years, is one of the key signatures of Active Galactic Nuclei (AGNs). These astrophysical sources release a large amount of their energy at gamma rays, in turn making the high-energy band (>100MeV) a fascinating and crucial domain to study. I will discuss some recent results in the field which have been enabled by the Large Area Telescope on the Fermi satellite. Moreover, I will show progresses in several other astrophysical grounds which directly benefit from the better description of the AGN population and the insights gained on AGN physics.

Primary author: BUSON, Sara (INFN & University of Padova)

Presenter: BUSON, Sara (INFN & University of Padova)

Session Classification: Cosmic Ray origin, Gamma and Neutrino Astronomy

Contribution ID: **47** Type: **not specified**

A Multi-purpose Cosmic Ray Experiment: The LHAASO Project

Saturday, 24 May 2014 11:25 (25 minutes)

As one of encouraging approaches to search for cosmic ray origins, the VHE gamma ray astronomy has achieved such a success that more than 140 VHE gamma ray sources has been discovered, mainly by using the pointing Cherenkov telescopes such as HESS, MAGIC and VERITAS. Some sources have been deeply investigated for their morphology. The origin of the cosmic rays is still unknown. It might become crucial that the spectrometric investigation of the sources over a wide energy range from 0.1 TeV to 1 PeV in the hunting for smoking guns. A wide field of view and full duty cycle instrument is proposed by the group who has successfully carried out two experiments, ARGO-YBJ and ASγ at 4300m a.s.l. in last 20 years. With the proposed LHAASO project, one can survey all sources brighter than 0.01Crab unit for their photon spectra up to 1 PeV. This project also keeps the momentum of discovery of new sources, particularly extended sources or high energy cosmos accelerators. Not only for photons, the LHAASO detector will be able to measure spectra of diffusive particles, i.e. photons, protons, helium nuclei and all heavy species. This will significantly boost the performance of cosmic ray measurements in the energy region of "knees". The scientific prospects, detector performance and important observational results in the experiments with prototype detectors will be summarized in this presentation.

Primary author: CAO, Zhen (Institute of High Energy Physics)

Presenter: CAO, Zhen (Institute of High Energy Physics)

Session Classification: Future Prospects

Contribution ID: **48** Type: **not specified**

An update on dark matter searches

Tuesday, 20 May 2014 09:25 (25 minutes)

The identification of the nature of the dark matter component of the Universe remains one of the most fundamental open issues in science today. Recent results from direct and indirect dark matter searches will be reviewed, considering their impact on some of the competing theoretical frameworks. Future perspectives and the connections with searches at the LHC will also be discussed.

Primary author: ULLIO, Piero (SISSA - INFN TS)

Presenter: ULLIO, Piero (SISSA - INFN TS)

Session Classification: Dark Matter

Contribution ID: **49** Type: **not specified**

Recent Results from the Telescope Array Experiment

Friday, 23 May 2014 12:05 (25 minutes)

We report on recent results on the spectrum, composition and anisotropy of the highest energy cosmic rays as measured by the Telescope Array experiment. New results include indication of a clustering of cosmic rays from a location near the super-galactic plane and improved methods for comparing composition results between Telescope Array and the Pierre Auger observatory. Plans for expansion of the Telescope Array to four times its current size will also be presented.

Primary author: SOKOLSKY, Pierre (University of Utah)

Presenter: SOKOLSKY, Pierre (University of Utah)

Session Classification: Cosmic Rays

Contribution ID: **50** Type: **not specified**

High-Energy Neutrino Astronomy with the ANTARES Deep-Sea Cherenkov detector and with the future KM3NeT Telescope.

Thursday, 22 May 2014 17:50 (25 minutes)

In 2008 the ANTARES collaboration completed the construction of an underwater neutrino telescope in the Mediterranean Sea, located 40 km off the French coast at a depth of 2475 m. With an effective area for upward muon detection of about 0.05 km2, depending on neutrino energy, ANTARES is the largest neutrino detector currently operating in the Northern hemisphere.
The experiment aims to detect high-energy neutrinos up to 104 TeV using a 3-dimensional array of 885 photomultipliers distributed in 25 storeys along 12 vertical lines. The detection is based on the measurement of Cherenkov light, induced by the path, in sea-water, of charged leptons resulting from charged-current neutrino interactions in the matter surrounding the telescope. The accurate measurements of the photon arrival times and of the deposited charge together with a precise knowledge of the actual positions and orientations of the photo sensors allow the reconstruction of the direction of neutrinos with good angular resolution (better than 0.3o for muon neutrinos above a few TeV) and of their energy. The goal of the experiment is to unravel the production and acceleration mechanisms of very energetic cosmic particles, to search for neutrino point sources as well as for dark matter and exotic particles like monopoles and nuclearites.
Recent ANTARES results will be presented. KM3NeT Collaboration has started to build in the Mediterranean Sea a neutrino telescope with a volume of several cubic kilometres. Using the experience gained by the precursor projects, this telescope will complement IceCube, ensuring full coverage of the sky. Due to its location, it will have a privileged access to the Galactic centre and to a large fraction of the Galactic plane. In this contribution, I will describe the technical and scientific aspects of KM3NeT, recently achieved milestones and the construction plans.

Summary

ANTARES results will be discussed, KM3NeT physics goals and construction status will be presented.

Primary author: CAPONE, Antonio (ROMA1)

Presenter: CAPONE, Antonio (ROMA1)

Session Classification: Neutrino

Contribution ID: **51** Type: **not specified**

LHC results and the interpretation of cosmic ray data

Wednesday, 21 May 2014 10:40 (25 minutes)

Measurements of particle production at LHC have given us a better understanding of high-energy multiparticle production. This has lead to a reduction of the uncertainties of model predictions. Still there are some surprising observations that are difficult to describe even with models tuned to give a good description of LHC data. After giving an introduction to the relation between air shower observables and properties of hadronic interactions we will discuss LHC and fixed-target measurements with respect to their interpretation within hadronic interaction models. In the second part we will study what we can learn from cosmic ray observations at very high energy and illustrate remaining uncertainties.

Primary author: ENGEL, Ralph (Karlsruhe Institute of Technology (KIT))

Co-authors: ULRICH, Ralf (KIT); Dr PIEROG, Tanguy (Karlsruhe Institute of Technology (KIT))

Presenter: ENGEL, Ralph (Karlsruhe Institute of Technology (KIT))

Session Classification: Particle Physics/Interactions/Astroparticle Physics

Contribution ID: **52** Type: **not specified**

Digging out Dark Energy properties from the Large Scale Structure of the Universe

Tuesday, 20 May 2014 09:50 (25 minutes)

After the tremendous success of the CMB measurements, the next frontier of precision cosmology is the study of the Large Scale Structure of the Universe, by means of present and future large galaxy surveys. I will discuss the potential of these observations for the extraction of information relevant for fundamental physics, such as the properties of Dark Energy and of neutrinos. Compared to the CMB, the main difficulty here is to deal with the various sources of nonlinearities of the density field. I will briefly illustrate how tools from field theory can be successfully applied to these problems.

Primary author: PIETRONI, Massimo (INFN-Padova and University of Parma)

Presenter: PIETRONI, Massimo (INFN-Padova and University of Parma)

Session Classification: Dark Matter

Contribution ID: **53** Type: **not specified**

Astroparticle Physics with the LHCf Detector at LHC

Friday, 23 May 2014 17:50 (25 minutes)

The LHCf detector has been conceived to profit of the unprecedented energies reachable at LHC to provide calibrations of the Monte Carlo models used in High Energy Cosmic Rays Physics through the measurement of the neutral particle spectra produced in the very forward region at LHC. Results of the p-p as well as the p-Pb runs will be shown together with the future plans for the forthcoming run at 13 TeV.

Primary author: TRICOMI, Alessia Rita (CT)

Presenter: TRICOMI, Alessia Rita (CT)

Session Classification: Cosmic Rays

Contribution ID: **54** Type: **not specified**

Are we seeing dark matter with the Fermi-LAT in a region around the Milky Way center?

Tuesday, 20 May 2014 17:00 (25 minutes)

There is overwhelming evidence that non-baryonic dark matter constitutes ~27% of the energy density of the universe. Weakly Interacting Massive Particles (WIMPs) are promising dark matter candidates that may produce gamma rays via annihilation or decay detectable by the Fermi Large Area Telescope (Fermi-LAT). Cosmological N-body simulations predict the central part of a galaxy to enclose the highest dark matter density all over the galaxy. I will discuss recent results from indirect WIMP searches in the data collected by the Fermi-LAT from the region around the Milky Way center.

Primary author: GOMEZ VARGAS, German Arturo (Universidad Catolica de Chile - INFN Roma Tor Vergata)

Presenter: GOMEZ VARGAS, German Arturo (Universidad Catolica de Chile - INFN Roma Tor Vergata)

Session Classification: Dark Matter

Contribution ID: **55** Type: **not specified**

Euclid space mission: a challenge devoted to the study of Cosmological Dark Energy & Dark Matter

Tuesday, 20 May 2014 12:40 (25 minutes)

Euclid is the next ESA mission devoted to Cosmology. The mission is expected to be launched in year 2020 and to last six years. The on board instruments have wide field capabilities and are provided by the Euclid Consortium. The payload is hosting a visible and a near infrared camera which cover a joint field of view of half square degree.

The main scientific aim is the study of Dark Energy and Dark Matter. These will be studied over ~15000 square degrees via gravitational lensing from imaging and clustering from NIR slitless spectra.

The survey will cover most of the extragalactic sky, therefore the wealth of data data will be extremely valuable to several areas in astrophysics. Indeed, the sheer amount of data of different kinds, the variety of (un)known systematic effects and the complexity of measures require novel efforts both in simulations and techniques of data analysis.

Primary author: SCARAMELLA ROBERTO, Roberto (Osservatorio Astronomico di Roma)

Presenter: SCARAMELLA ROBERTO, Roberto (Osservatorio Astronomico di Roma)

Session Classification: Dark Matter

Contribution ID: **56** Type: **not specified**

Ground-Based Gamma-Ray Astronomy

Thursday, 22 May 2014 09:00 (25 minutes)

When viewed at TeV energies the universe appears fundamentally different then when observed in the visible range. Thermal sources are non-existent and one sees only the most extreme objects: black holes from a few solar masses to billions of solar masses, neutron stars, and supernova remnants. These objects (and others) are capable of accelerating electrons and hadrons to energies well beyond a TeV. In addition to understanding these cosmic sources, one can use these sources to probe fundamental physics at scales not accessible to earthbound accelerators. In this talk I will present an overview of ground-based gamma-ray astronomy, discuss the different techniques used to detect energetic gamma rays, and present recent results in fundamental physics and astrophysics.

Primary author: SINNIS, Gus (Los Alamos National Laboratory)

Presenter: SINNIS, Gus (Los Alamos National Laboratory)

Session Classification: Cosmic Ray origin, Gamma and Neutrino Astronomy

Contribution ID: **57** Type: **not specified**

Diffuse radio emission in galaxy clusters: crossroad between astrophysics and cosmology

Monday, 19 May 2014 09:50 (25 minutes)

Radio observations prove the existence of relativistic particles and magnetic fields associated with the intra-cluster-medium (ICM) through the presence of extended synchrotron emission. These non-thermal components in galaxy clusters are unique probes of very energetic processes operating within clusters that drain gravitational and electromagnetic energy into cosmic rays and magnetic fields.
In this review I will discuss the acceleration and transport of cosmic rays in galaxy clusters and the most relevant observational milestones that have provided important steps on our understanding of this physics. Finally, looking forward to the possibilities from new generations of observational tools, I will focus on what appear to be the most important prospects for the near future from radio and
high-energy observations.

Primary author: BRUNETTI, Gianfranco (IRA - INAF)

Presenter: BRUNETTI, Gianfranco (IRA - INAF)

Session Classification: Astrophysics/Cosmology

Contribution ID: **58** Type: **not specified**

Hadronic cross sections in extensive air showers and at accelerators

Wednesday, 21 May 2014 11:25 (25 minutes)

The measurement of the proton-air cross section of hadronic particle production with the Pierre Auger Observatory is reviewed. In this context the relation of the proton-air to the proton-proton cross section is discussed in detail, and the underlying modelling problems of this conversion are highlighted. It is shown, how a combination of accelerator and cosmic-ray measurements could help to resolve these problems.

Primary author: ULRICH, Ralf (KIT)

Co-author: Dr ENGEL, Ralph (Karlsruhe Institute of Technology (KIT))

Presenter: ULRICH, Ralf (KIT)

Session Classification: Particle Physics/Interactions/Astroparticle Physics

Contribution ID: **59** Type: **not specified**

An alternative gravity model with a non-minimal coupling between matter and curvature

Monday, 19 May 2014 17:50 (25 minutes)

We examine an extension of General Relativity with an explicit non-minimal coupling between matter and curvature. The purpose of this work is to present an overview of the implications of the latter to various contexts, ranging from astrophysical matter distributions to a cosmological setting. Various results are discussed, including the im- pact of this non-minimal coupling on the choice of Lagrangian density, on a mechanism to mimic galactic and cluster dark matter, on the possibility of accounting for the ac- celerated expansion of the Universe, energy density fluctuations and modifications to post-inflationary reheating, and the equivalence between this model and multi-scalar-theories.

Primary author: PÁRAMOS, Jorge (Faculdade de Ciências da Universidade do Porto)

Co-author: Prof. BERTOLAMI, Orfeu (Faculdade de Ciências da Universidade do Porto)

Presenter: PÁRAMOS, Jorge (Faculdade de Ciências da Universidade do Porto)

Session Classification: Astrophysics/Gravitational Waves and Gravity

Contribution ID: **60** Type: **not specified**

The heavy knee and the light ankle observed with KASCADE-Grande

Friday, 23 May 2014 11:40 (25 minutes)

Investigations of the energy spectrum as well as the mass composition of cosmic rays in the energy range of PeV to EeV are important for understanding both, the origin of the galactic and the extragalactic cosmic rays. The multi-detector arrangement of KASCADE and its extension KASCADE-Grande was designed for observations of cosmic ray air showers in this energy range. Most important result from KASCADE is the proof that the knee feature at several PeV is due to a decrease in the flux of light atomic nuclei of primary cosmic rays. Recent results of KASCADE-Grande have now shown two more spectral features: a knee-like structure in the spectrum of heavy primaries at around 90 PeV and a hardening of the spectrum of light primaries at energies just above 100 PeV. In this talk the present KASCADE-Grande results on energy spectrum and composition are compared with astrophysical models for the energy range, where the transition from galactic to extragalactic origin of cosmic rays are expected.

Primary author: HAUNGS, Andreas (Karlsruhe Institute of Technology - KIT)

Presenter: HAUNGS, Andreas (Karlsruhe Institute of Technology - KIT)

Session Classification: Cosmic Rays

Contribution ID: **61** Type: **not specified**

Fundamental Physics in the ESA Program

Monday, 19 May 2014 12:40 (25 minutes)

Atomic clocks and high-performance links, classical accelerometers and atom interferometry sensors are today able to measure frequency, time, and distances, as well as to track the motion of massive bodies, quantum particles, and light to accuracy levels never reached before. These instruments achieve their ultimate performance in space, where the clean environment and the free-fall conditions become essential for identifying tiny deformations in space-time that might bring the signature of new physics or new fundamental constituents.
This paper will discuss the space-based research presently on-going in ESA in the fundamental physics domain.

Primary author: CACCIAPUOTI, Luigi (European Space Agency)

Presenter: CACCIAPUOTI, Luigi (European Space Agency)

Session Classification: Astrophysics/Gravitational Waves and Gravity

Contribution ID: **62** Type: **not specified**

Cherenkov Telescope Array: Science prospects and project status

Thursday, 22 May 2014 09:50 (25 minutes)

The Cherenkov Telescope Array (CTA) is a ground-based gamma-ray observatory operating from some tens of GeV to above 100 TeV that is currently designed and prepared by an international consortium of scientists and engineers around the globe. CTA is proposed to operate an an open observatory with two sites, one in the southern and one in the northern hemisphere, providing full sky coverage with unprecedented sensitivity, angular resolution and energy coverage. In this talk I will introduce the CTA Observatory, present its science prospects and provide a summary of the current project status.

Primary author: KNÖDLSEDER, Jürgen (IRAP)

Presenter: KNÖDLSEDER, Jürgen (IRAP)

Session Classification: Cosmic Ray origin, Gamma and Neutrino Astronomy

Contribution ID: **63** Type: **not specified**

Dark Z' : from direct detection to LHC

Wednesday, 21 May 2014 10:15 (25 minutes)

In this talk, I will review the main theoretical motivations to build an extension of the Standard Model by a new Gauge group. I will then study the phenomenological consequences of the presence of the new gauge boson Z' on dark matter phenomenology and the perspective of discovery at LHC, underground laboratory or indirect detection experiments.

Primary author: MAMBRINI, Yann (LPT Orsay)

Presenter: MAMBRINI, Yann (LPT Orsay)

Session Classification: Particle Physics/Interactions/Astroparticle Physics

Contribution ID: **64** Type: **not specified**

SuperCDMS: Recent results on low mass WIMPs

Tuesday, 20 May 2014 10:15 (25 minutes)

The SuperCDMS experiment attempts direct detection of Weakly Interacting Massive Particles (WIMPs) through their elastic scattering on an array of cryogenic interleaved germanium detectors (iZIP).
These detectors are instrumented with ionization and phonon sensors that provide position sensitivity and the capability to discriminate nuclear recoils over other sources of background.
In this talk we present the recent results from the first WIMP search using the background rejection capabilities of the SuperCDMS iZIP detectors.
The dataset corresponds to an exposure of 577 kg-day, obtained with seven detectors presenting the lowest trigger threshold, 1.6 KeVnr.
A blinded analysis of this data results in an upper bound for the spin-independent WIMP-nucleon cross section, which is particularly stringent for low-mass WIMPs.
This result is in tension with WIMP interpretations of other recent experiments.

Primary author: CERDENO, David G. (Instituto de Fisica Teorica)

Presenter: CERDENO, David G. (Instituto de Fisica Teorica)

Session Classification: Dark Matter

Contribution ID: **67** Type: **not specified**

The quest for gravitational waves: a global strategy

Saturday, 24 May 2014 12:15 (25 minutes)

Direct detection of gravitational waves from astrophysical sources is one of the great challenges of contemporary experimental physics. Gravitational waves were predicted almost 100 years ago by Einstein and their detection motivates today about one thousand scientists, constructing new apparatuses and developing advanced technologies and data analysis algorithms. Observation and study of gravitational radiation will give unique information on compact cosmic objects (black holes and neutron stars) and on gravitational physics at extreme conditions. The study of primordial gravitational waves would uniquely allow the investigation of processes in the very early universe, since gravitons decoupled from the primordial plasma below the Planck scale and hence are able to bring information on very high energy physics which cannot be accessed experimentally in any other way. The status of this field of research is reviewed, and the perspectives of opening this new astronomical window in the next years with the advanced interferometers Virgo and LIGO will be reported.

Primary author: COCCIA, Eugenio (INFN-GSSI and U. of Rome Tor Vergata)

Presenter: COCCIA, Eugenio (INFN-GSSI and U. of Rome Tor Vergata)

Session Classification: Future Prospects

Contribution ID: **70** Type: **not specified**

The Pierre Auger Observatory: highlights and future projects

Friday, 23 May 2014 12:30 (25 minutes)

The Pierre Auger Observatory aim is that of studying the ultra high energy cosmic rays, above 10^17 eV. The extremely high quality of the data has led to a number of major breakthroughs.
The ankle and the suppression of the flux are clearly established; we present the results on the charged primary composition and the best current limits on cosmogenic photons and neutrinos. We will discuss the results in terms of the UHE cosmic ray origin and of the perspectives for an upgrade of the Observatory.

Primary author: CASTELLINA, Antonella (INFN-TO)

Presenter: CASTELLINA, Antonella (INFN-TO)

Session Classification: Cosmic Rays

Contribution ID: **71** Type: **not specified**

A new technique for direct investigation of dark matter

Tuesday, 20 May 2014 18:35 (25 minutes)

The MOSCAB experiment (Materia OSCura A Bolle) uses a new technique for dark matter search. The Geyser technique was applied to the construction of a prototype detector of a mass of 0.5 kg and the encouraging results are reported in the talk; an accent is placed on a big detector of 40 kg in construction at the University and I.N.F.N. of Milano-Bicocca.

Primary author: PULLIA, Antonino (MIB)

Presenter: PULLIA, Antonino (MIB)

Session Classification: Dark Matter

Contribution ID: **75** Type: **not specified**

Future in Astroparticle at INFN

Saturday, 24 May 2014 09:25 (25 minutes)

INFN has an outstanding tradition of research in the field of astroparticle physics. The bulk of the experiments are performed at LNGS but the presence of INFN is visible also in space, underwater and remote lands. The most important question we ask ourselves is : what next. A new generation of underground experiments is needed for double beta decay and the mostly elusive dark matter. But we should not ignore that important answers comes from the observation of the cosmos. We need also to properly address the long standing issue of the sterile neutrinos of for which we have the right technology at hand and we should also start to give a closer look at experiments able to look for axions. A great challenge to be carried on in the frame of an enhanced international cooperation.

Primary author: FERRONI, Fernando (ROMA1)

Presenter: FERRONI, Fernando (ROMA1)

Session Classification: Future Prospects

Contribution ID: **76** Type: **not specified**

Cosmic Microwave Background from ground-based and space experiments

Monday, 19 May 2014 11:00 (25 minutes)

The tiny temperature and polarization anisotropies of the cosmic microwave background (CMB) radiation encode a wealth of information about our Universe. The CMB anisotropies have been the target of many experiments in the past twenty years, starting with COBE's observations of the large-scale temperature fluctuations in the early 90s.
In 2013, the Planck satellite provided the most accurate measurements of the CMB temperature power spectrum to date, while, only a few weeks ago, the BICEP2 collaboration detected a B-mode polarization pattern at degree angular scales, of possibly primordial origin. Further advancements from the observational point of view are expected in the near future, as Planck will be releasing, at the end of this year, the full mission data (including polarization), while other experiments, specifically designed to target polarization, are either already operational or will be soon.
In my talk I will give an overview of current ground-based and space CMB experiments, and briefly discuss the theoretical implications of their observations, as well as some open questions. Finally, I will review the status of incoming and future experiments.

Primary author: LATTANZI, Massimiliano (FE)

Presenter: LATTANZI, Massimiliano (FE)

Session Classification: Astrophysics/Cosmology

Contribution ID: **77** Type: **not specified**

Double Chooz: Towards the near detector phase

Thursday, 22 May 2014 18:15 (25 minutes)

Reactor anti-neutrino experiments have stood out in recent years with the measurement of the last mixing angle Theta 13.

Double Chooz is one such experiment whose sensitivity will increase with the addition of the near detector, which is set to start data taking later this year.

I will present results from three separate analyses, neutron capture on either Gd or H and a background-independent analysis using the known modulation of the reactor anti-neutrino flux.

Primary author: STOKES, Lee F F (University of Tübingen)

Presenter: STOKES, Lee F F (University of Tübingen)

Session Classification: Neutrino

Contribution ID: **78** Type: **not specified**

Astroparticle in Europe

Saturday, 24 May 2014 09:50 (25 minutes)

I will report on the roadmap on Astroparticle Physics in the process of elaboration by the Scientific Advisory Commitee of tha Astroparticle Physics European Consortium. The ambition of this roadmap is to be a realistic roadmap matching the current and previsional financial situation in Europe.

Primary author: KATSANEVAS, Stavros (university Paris 7/IN2P3/CNRS)

Presenter: KATSANEVAS, Stavros (university Paris 7/IN2P3/CNRS)

Session Classification: Future Prospects

Contribution ID: **79** Type: **not specified**

Architecture for exploration & gravity study at edge of Solar System

This paper arises from the pre-assessment study of FOCAL mission proposed by Italian researchers to place a probe beyond 550 AU, where the gravity lens of the Sun phenomenon can be exploited for radio-astronomy purposes. The aim of the study is to explore the feasibility of this mission in a reasonable time, which is set to be around 50 years.
The envisaged solution combines a chemical upper stage with a low-thrust phase. The former is used to put the spacecraft on a direct trajectory to Jupiter, the latter starts soon after the escape from Jupiter's SOI and should last for a decade. Nuclear electric propulsion (NEP) has been selected as the baseline in the second phase, after a trade-off supported by a preliminary numerical analysis among solar sails and SEP.
Basing on the actual technology, 3.2 light days distance from Earth is quite demanding for the link budget, and it is a core requirement for the sizing of the spacecraft at its scientific phase. FOCAL scientific requirements ask for around 100 dB in gain at the Hydrogen natural frequency: 56 dB coming from the Sun's lens and the rest from the antenna.
A trade-off between power, mass budget and data rate brought to an antenna diameter of 6 meters, a mass around 169 kg and a data rate of 4kbit/s in downlink at 550 AU and 1kbit/s at 1000 AU. A traditional rigid deployable antenna has been selected instead of an inflatable technology, due to the low TRL of this alternative and uncertainties on its resistance in a very harsh environment (still unknown) for very long time.
According to the ASTRO-FOCAL concept, the selected directrix for the escaping trajectory points in the opposite direction of the galactic centre position on the celestial sphere. Thus, a significant out-of-ecliptic velocity has to be gained. The mission design plans to use a single flyby of Jupiter for achieving both the correct orbital plane and sufficient velocity to set the spacecraft on the solar system escape orbit. Flyby is performed on March 6th 2039 and the Jovian hyperbolic passage has a pericenter altitude of about 167,000 Km. Departure from the sphere of influence of Earth occurs on September 28th 2037 on a trajectory for a direct ascent to Jupiter. The departure window lasts for about 10 days. The energy for this departure is to be provided by a single or multi-stage cryogenic upper stage. The optimization of the internal solar system mission design has been assessed using a custom developed multi-objective genetic algorithm. Planning a multi-gravity assist solar system tour proved to be unadvisable for the long time-of-flight it would require, which would reduce the useful life of the nuclear reactor, that is a limiting factor for the low-thrust phase.
An optimization analysis has been implemented in order to find out the main propulsive parameters required by the low thrust phase. After a preliminary trade-off among the available technologies, three High Power Gridded Ion Thrusters have been considered: HiPEP (NASA GRC), NEXIS (NASA JPL) and DS4G (ESA). The class of these thrusters refers to a power range of 30-100 kW, specific impulse of 7,000-11,000 s, thruster efficiency higher than 75% and a life range of 7-10 years. Significant results have been obtained in the case of a simple step on the thrust profile: the "minimum weight"solution has been found with a constant thrust of 0.45 N and a specific impulse of 8800 s, given for 15.25 years (after the Jupiter GA) by a single HiPEP switched on. Power required is 26.6 kW and it is supplied by a nuclear fission reactor through a thermo-ionic conversion, preferable to the most promising Brayton. Nuclear power system has been designed according to updated literature and assuming a lifetime of about 15 years. Finally the scientific phase beyond 550 AU and the cruise to Jupiter is powered by a set of RTGs.
This proposed solution aims to reach the targeted 550 AU in 55 years. A sensitivity analysis has

been made, making it possible to reduce the time of travel down to 45 years, but involving necessarily multiple launches and relative docking manoeuvres in LEO. The selected launcher is the Space Launch System (SLS) Block II, whose first launch is scheduled for 2032.
The resulting architecture is exploitable for many other high delta-v missions to the edge of the solar system, being interested in the Local Interstellar Medium, distant Kuiper Belt Objects or inner Oort cloud objects. To increase the scientific return in the mid-term (soon after 16 years), a medium-size payload (50 kg) is planned to be added, leading an increase of the 14% on the overall mass to launch, still without affecting the actual baseline architecture.
In this paper the configuration alternatives will be presented along with the discussion on the subsystems sizing and the trade-offs. These have been performed as a function of the technological level, focusing on the enabling technologies.

Primary author: Prof. LAVAGNA, Michelle (Politecnico di Milano)

Presenter: Prof. LAVAGNA, Michelle (Politecnico di Milano)

Contribution ID: **80** Type: **not specified**

The JEM-EUSO mission

Saturday, 24 May 2014 11:50 (25 minutes)

The exploration of the Extreme Universe, at energies around 10^20 eV, from space has now an history of studies and experimental and technological developments which traces back to about 20 years ago. In this contribution I will briefly summarize the science rationale behind the search from space of EECRs and I will then discuss the most recent developments of the studies on the EUSO configuration onboard the JEM module of the ISS. I will also present the current status of the pathfinder activities and potentially alternative mission scenarios.

Primary author: SANTANGELO, Andrea (IAAT Kepler Center, University of Tuebingen)

Presenter: SANTANGELO, Andrea (IAAT Kepler Center, University of Tuebingen)

Session Classification: Future Prospects

Contribution ID: **82** Type: **not specified**

Welcome Address

Monday, 19 May 2014 08:45 (15 minutes)

Presenters: MANNOCCHI, Giampaolo (LNF); FUSCO FEMIANO, Roberto (IASF-Roma/INAF)

Session Classification: Astrophysics/Cosmology

Contribution ID: **83** Type: **not specified**

The OPERA experiment : new results

Thursday, 22 May 2014 18:40 (25 minutes)

The OPERA experiment : new results.

The OPERA experiment is designed to search for nu_mu->nu_tau oscillations in appearance mode through the direct observation of the tau lepton in nu_tau Charged Current interactions. The nu_tau CC interaction is identified through the detection of the τ lepton decay topology in the so called Emulsion Cloud Chamber (ECC), passive lead plates constituting the target mass interleaved with nuclear emulsion films providing the high spatial resolution. Electronic detectors complement the ECCs.

The experiment recorded data for five years, since 2008, with the CNGS, a quasi-pure nu_mu beam from CERN to the Gran Sasso laboratory LNGS, collecting 1.8 ×1020 protons on target. The running of the detector and the data collection from the emulsions films by means of fast automatic optical microscopes will be described, together with the special procedures used to locate the interactions vertices and to detect short decay topologies. OPERA has also good capabilities in detecting electron neutrino interactions and can set limits on the nu_mu->nu_e oscillation channel. Since last year, a large amount of additional data has been analyzed. The latest results on oscillations with the increased statistics, including the fourth tau neutrino candidate event, will be presented.

Primary author: SIRIGNANO, Chiara (PD)

Presenter: SIRIGNANO, Chiara (PD)

Session Classification: Neutrino

Contribution ID: **85** Type: **not specified**

AMS Experiment

Monday, 19 May 2014 11:50 (25 minutes)

Primary author: BATTISTON, Roberto (TIFP)

Presenters: PILO, Federico (PI); BATTISTON, Roberto (TIFP)

Session Classification: Cosmic Rays

Contribution ID: **87** Type: **not specified**

Recent results of the XENON100 experiment and future goals of the XENON project

Tuesday, 20 May 2014 11:50 (25 minutes)

The XENON collaboration is presently running its second detector, XENON100, which led the field of direct dark matter search for many years. Recently the collaboration published many new results, such as exclusion limits on spin dependent and spin independent cross section interaction of WIMPs with ordinary matter. Very competitive results were also published on the search of Axion-like particles in the mass range of KeV. While still taking data with XENON100 the collaboration is also committed to build the third generation detector. This will start the era of the XENON detector with an active mass on the ton scale, aiming at obtaining unprecedented results. An exhaustive presentation of all topics mentioned above will be given in the talk.

Primary author: MESSINA, Marcello (Columbia University)

Presenter: MESSINA, Marcello (Columbia University)

Session Classification: Dark Matter

Contribution ID: **88** Type: **not specified**

LHC: link with cosmology and astroparticle

Tuesday, 20 May 2014 19:00 (25 minutes)

Primary author: MASIERO, Antonio (PD)

Presenter: MASIERO, Antonio (PD)

Session Classification: Cosmology/Astroparticle

Contribution ID: **89** Type: **not specified**

Detection of B-mode Polarization using BICEP2

Monday, 19 May 2014 18:40 (25 minutes)

Primary author: ORLANDO, Angiola (University of California, San Diego)

Presenter: ORLANDO, Angiola (University of California, San Diego)

Session Classification: Astrophysics/Gravitational Waves and Gravity

Contribution ID: **90** Type: **not specified**

Formation and Evolution of LSS

Wednesday, 21 May 2014 09:00 (25 minutes)

Primary author: DOLAG, Klaus (USM)

Presenter: DOLAG, Klaus (USM)

Session Classification: Astrophysics/Cosmology

Contribution ID: **91** Type: **not specified**

Higgs bosons in the Standard Model and beyond

Wednesday, 21 May 2014 09:25 (25 minutes)

Primary author: BERTOLUCCI, Sergio (CERN)

Presenter: BERTOLUCCI, Sergio (CERN)

Session Classification: Particle Physics/Interactions/Astroparticle Physics

Contribution ID: **92** Type: **not specified**

Astroparticle Physics at LNGS

Wednesday, 21 May 2014 12:40 (25 minutes)

Primary author: RAGAZZI, Stefano (MIB)

Presenter: RAGAZZI, Stefano (MIB)

Session Classification: Particle Physics/Interactions/Astroparticle Physics

Contribution ID: **93** Type: **not specified**

SNRs as cosmic accelerator

Thursday, 22 May 2014 09:25 (25 minutes)

Primary author: MICELI, Marco (INAF-Osservatorio Astronomici di Palermo G. S. Vaiana)

Presenter: MICELI, Marco (INAF-Osservatorio Astronomici di Palermo G. S. Vaiana)

Session Classification: Cosmic Ray origin, Gamma and Neutrino Astronomy

Contribution ID: **94** Type: **not specified**

GRBs in the multimessenger era

Thursday, 22 May 2014 11:25 (25 minutes)

Primary author: TROJA, Eleonora (NASA/GSFC)

Presenter: TROJA, Eleonora (NASA/GSFC)

Session Classification: Cosmic Ray origin, Gamma and Neutrino Astronomy

Contribution ID: **96** Type: **not specified**

Measurement of the Cosmic Ray energy spectrum with ARGO-YBJ

Friday, 23 May 2014 09:50 (25 minutes)

The ARGO-YBJ detector, located at high altitude in the Cosmic Ray Observatory of Yangbajing in Tibet (4300 m asl, about 600 g/cm2 of atmospheric depth) provides the opportunity to study, with unprecedented resolution, the cosmic ray physics in the primary energy region between 10^12 and 10^16 eV.
The preliminary results of the measurement of all-particle and light-component (i.e. protons and helium) energy spectra between approximately 5 TeV and 5 PeV will be reported and discussed.
The study of such energy region is particularly interesting because not only it allows a better understanding of the so called knee of the energy spectrum and of its origin, but also provides a powerful cross-check among very different experimental techniques. The comparison between direct measurements by balloons/satellites and the results by surface detectors, implying the knowledge of shower development in the atmosphere, also allows to test the hadronic interaction models currently used for understanding particle and cosmic ray physics up the highest energies.

Primary author: DI SCIASCIO, Giuseppe (ROMA2)

Presenter: DI SCIASCIO, Giuseppe (ROMA2)

Session Classification: Cosmic Rays

Contribution ID: **99** Type: **not specified**

Future reactor neutrino experiments in China

Saturday, 24 May 2014 09:00 (25 minutes)

Primary author: CAO, Zhen (Institute of High Energy Physics)

Presenter: CAO, Zhen (Institute of High Energy Physics)

Session Classification: Future Prospects

Contribution ID: **101** Type: **not specified**

The knee of proton spectrum

Friday, 23 May 2014 10:15 (15 minutes)

Presenter: Prof. CAO, Zhen (Institute of High Energy Physics)

Session Classification: Cosmic Rays