

RICAP'07 - Roma International Conference on Astroparticle Physics

Wednesday 20 June 2007 - Friday 22 June 2007

**University of Roma "La Sapienza"
Programme**

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Wednesday 20 June 2007

Registration and welcome lunch - Physics Dept. (10:00-14:00)

Wednesday 20 June 2007

Plenary Session: Gamma Detection - 1 - Aula Magna Rettorato (14:30-16:50)

time title

14:30	<p>Welcome and Conference opening (00h15') <i>S ak : CAPONE (CHAIRMAN OF THE CONFERENCE), A t i , RONGA (CHAIRMAN OF "INFN COMMISSIONE SCIENTIFICA II (ASTROPARTICLE PHYSICS)", F a</i></p>
14:45	<p>TeV Gamma-Ray Observations with Milagro (00h25') <i>S ak : SINNIS, G</i> In this paper I will report on the analysis of data taken with the Milagro Observatory within 10 degrees of the Galactic plane between Galactic longitude 30 and 220 degrees. Three new sources of TeV gamma rays have been discovered, all of which are coincident with sources in the EGRET GeV catalog. In addition, there are 5 locations, that warrant further study. In particular, there is a 5 standard deviation excess observed from Geminga. In addition to these sources, the diffuse emission from the Galaxy has been detected at ~10 TeV. The intensity of the diffuse emission is greater than that predicted by models, indicating that there may be a class of unresolved gamma-ray sources or localized sites of cosmic-ray acceleration. Finally, I will discuss our future plans for HAWC, a High Altitude Water Cherenkov observatory that will have over 10 times the sensitivity of the Milagro observatory.</p>
15:10	<p>ARGO-YBJ experiment in Tibet (00h25') <i>S ak : D'ALI' STAITI, Gia</i> The setting-up of the ARGO detector at the YangBaJing Cosmic Ray Laboratory (4300 m a.s.l., Tibet, P.R. China) has been completed during the last spring (2007). It consists of a central carpet made of 130 identical sub-units of 12 RPCs each ('cluster') covering a surface of about 5800 m**2 with 93% active area, and a guard ring of 24 further clusters of the same type surrounding the central carpet with a lower sampling density. Signals are picked-up by external electrodes of small size, thus allowing the sampling of EAS with high space-time granularity. Shower events are detected at a trigger rate of about 4 kHz. Events with a few particles detected by a single cluster are counted in scaler mode on a time base of 500 milliseconds. The intrinsic modularity of the ARGO detector allowed us to collect data even during the setting-up period, using only the central carpet (or even part of it). Some preliminary results from the analysis of events collected in a few months of data taking are presented.</p>
15:35	<p>Gamma-ray astronomy: Recent results from the H.E.S.S. telescope system (00h25') <i>S ak : PUEHLHOFER, G d</i> One of the promises of VHE gamma-ray astronomy has been to shed light on the acceleration sites of cosmic rays. The H.E.S.S. array of imaging Cherenkov telescopes has indeed revealed a large number of new VHE gamma-ray emitters, particularly in the Milky Way, but also outside our Galaxy. The talk aims to provide an overview of the different types of objects discovered. To unravel their astrophysical nature and the acceleration mechanisms in these sources, multiwavelength observations provide crucial input, and the connection to this information will be discussed.</p>
16:00	<p>Highlights of MAGIC results (00h25') <i>S ak : BASTIERI, D i</i> MAGIC is the largest Cherenkov telescope currently operating and is in full operation since September 2004. Since then, it is providing a full wealth of exciting new physics results from its observations in the VHE region of galactic and extragalactic locations. Among the main results that will be presented, the discoveries of new sources and even of entire new classes of sources and the observation of fast variability down to an unprecedented level of precision. Recent results for distant extragalactic sources are also shown: observations that are important for the development of new models of extragalactic background and to evaluate the systematic uncertainties of the imaging Cherenkov technique.</p>
16:25	<p>First Results from the VERITAS Gamma-ray Telescopes (00h25') <i>S ak : HANNA, David</i> VERITAS is an array of four 12m diameter Cherenkov telescopes, designed to explore the very high energy gamma-ray sky in the energy band between 100 GeV and 50 TeV. Its construction and commissioning have occurred over the past two years and the array has been taking scientific data with three or more telescopes since November 2006. We will present results from observations made with VERITAS during the past observing season, including new results on the sources 1ES 1218+304, M87 and LSI+61 303. We will also describe the plans in place for the coming observing seasons.</p>

Coffee break - Aula Magna Terrace (16:50-17:15)**Wednesday 20 June 2007****Plenary Session: Gamma Detection - 2 - Aula Magna Rettorato (17:15-18:55)**

time title

17:15	<p>CTA, next generation ground-based gamma-ray observatory (00h25') <i>S ak : TESHIMA, Ma ahi</i></p> <p>Gamma-ray astronomy is a newly emerging and very successful branch of astronomy and astrophysics. Exciting results have been obtained by the current generation Cherenkov telescope systems such as H.E.S.S., MAGIC, VERITAS and CANGAROO. The development of the very large Cherenkov telescope array system (CTA) with a sensitivity and an angular resolution about an order of magnitude better than current instruments is under intense discussion. This observatory will reveal an order of magnitude more sources, AGNs, SNRs, Pulsar Wind Nebulars and Binaries. Due to its higher sensitivity and angular resolution it may be able to detect new classes of objects and phenomena that have not been visible until now.</p>
17:40	<p>AGILE IN ORBIT (00h25') <i>S ak : TAVANI, Ma</i></p> <p>The AGILE satellite is devoted to high-energy astrophysics and combines optimal imaging and large field of view for a simultaneous detection in the energy bands 15-60 keV and 30 MeV - 30 GeV. The satellite is an ASI space mission with participation by INAF, INFN, several Universities, and the Italian space industry. The satellite was successfully launched to an optimal equatorial orbit on April 23, 2007. We will present the first results by the AGILE instrument in orbit and the prospects of the scientific program during the first year of operations.</p>
18:05	<p>Gamma-ray Large Area Space Telescope - GLAST (00h25') <i>S ak : MOISEEV, Al xa d</i></p> <p>The new Gamma-ray Large Area Space Telescope (GLAST) is scheduled for launch at the end of 2007. It contains the high-energy gamma-ray telescope LAT (Large Area Telescope) which covers the energy range from 20 MeV to > 300 GeV, and the GBM (GLAST Burst Monitor), covering 8 keV € 30 MeV. The GLAST science objectives include understanding the mechanism of charged particle acceleration in active galactic nuclei, pulsars, and supernova remnants, determining the nature of the still-unidentified EGRET sources, detailed study of gamma-ray diffuse emission, high-energy emission from gamma-ray bursts and transient gamma-ray sources, and probing dark matter. An overview of the mission is given.</p>
18:30	<p>INTEGRAL High Energy Sky: the keV to MeV cosmic sources (00h25') <i>S ak : UBERTINI, Pi t</i></p> <p>After almost 5 years of operation, ESA's INTEGRAL Space Observatory has unveiled a new soft Gamma ray sky and produced a remarkable portfolio of results, ranging from the inventory of the high energy sources, to the discovery of dozens of variable sources to the mapping of the Al and annihilation line in the Galaxy. INTEGRAL is continuing the deep observations of the Galactic Plane and of the whole sky in the soft Gamma ray range. The new IBIS gamma ray catalogue contains more than 420 sources detected above 20 keV. We present a view of the INTEGRAL high energy sky with particular regard to sources emitting at high energy, including AGNs, HESS/MAGIC counterpart and new view of the cosmic gamma ray diffuse background.</p>

Thursday 21 June 2007

Parallel Session: EAS and Gamma Detection - Aula Magna (09:00-11:00)

time title

09:00	<p>KASCADE-Grande: an overview and first results (00h15') <i>S ak : BERTAINA, Ma i</i> The KASCADE-Grande experiment, located at Forschungszentrum Karlsruhe, is a multi-component extensive air-shower experiment to study cosmic rays and their interactions at primary energies 10^{14}-10^{18}eV. After detailed investigations of the knee in the spectrum with the original KASCADE experiment, the main goal of the extended Grande array is the detection of the expected iron knee in the spectrum at around 10^{17}eV, and the measurement of the composition in the expected transition region between galactic and extragalactic components. Due to its multi-component characteristics, basically the KASCADE experiment enriched by two arrays of scintillator detectors (Grande and Piccolo) with the aim of providing large acceptance area (0.5km^2) and prompt trigger signal, KASCADE-Grande is a suitable array to provide refined measurements even in the 10^{16}-10^{18}eV region. An overview of the experiment, its performance and first results based on two years of data taking will be presented.</p>
09:15	<p>A new approach to EAS investigations in energy region 10^{15} - 10^{19} eV (00h15') <i>S ak : KOKOULIN, R ti lav</i> A new method of EAS investigations based on a new phenomenological variable - local muon density at the observation point - is discussed. It is shown that local muon density spectra are sensitive to primary spectrum shape, primary composition and hadronic interaction model. Ground level measurements of muon density spectra in a wide range of zenith angles provide the possibility to study EAS spectrum in very wide energy interval by means of a single, relatively small-size setup. New data on muon bundles obtained with Russian-Italian detector DECOR are compared with simulation results for different spectrum and interaction models.</p>
09:30	<p>The analysis of hybrid events in Auger (00h15') <i>S ak : SALAMIDA, F a</i> The Pierre Auger Observatory detects ultra-high energy cosmic rays by implementing two complementary air-shower measurements. The combination of the single tank information from the surface detector (SD) and the calorimetric measurements of the shower profile using the fluorescence detector (FD), known as the "hybrid" technique, provides a more reliable event reconstruction than using either detector alone. In this paper the approach used to evaluate the cosmic ray flux using this class of events is described. The analysis method is discussed considering its main steps: the event selection, the detector up time evaluation and the exposure calculation.</p>
09:45	<p>The Fluorescence Telescopes of the Pierre Auger Observatory (00h15') <i>S ak : GEENEN, H ik</i> The Pierre Auger Observatory is the largest extensive air-shower (EAS) experiment in the world. The aim of the experiment is to determine the energy, composition and origin of the UHE cosmic-rays above 1 EeV using two complementary detection techniques: a ground array of water Cherenkov tanks and fluorescence detectors. The fluorescence detectors are fully operational since February 2007. First physics results were presented in 2005. The fluorescence detector plays a major role not only in the calibration of the energy scale of the experiment, but also in the understanding of the systematics of the whole experiment using the data itself. This presentation focuses on the data taken by the 24 fluorescence telescopes. A summary of the current status and overview of the FD detector will be given. The reconstruction performance based on real data and Monte Carlo will be discussed. A summary on the systematics and preliminary results based on FD data are also presented.</p>
10:00	<p>Search for Gamma Ray Bursts with the ARGO-YBJ detector in Scaler Mode (00h15') <i>S ak : DI GIROLAMO, T i ta</i> The ARGO-YBJ experiment has been designed to decrease the energy threshold of typical Extensive Air Shower arrays by exploiting the high altitude and the full coverage, consisting of a 6700m^2 carpet of Resistive Plate Chambers located at Yangbajing (Tibet, P.R. China, 4300 m a.s.l.). The low energy limit of the detector (~ 1 GeV) is reached with the "Scaler Mode", recording the counting rate at fixed time intervals. Here we present results concerning the search for emission from Gamma Ray Bursts in coincidence with satellite detections.</p>
10:15	<p>Survey of the Northern Hemisphere Galactic Plane with Milagro (00h15') <i>S ak : SMITH, A d w J.</i> The Milagro Gamma-Ray Observatory is a water Cherenkov detector that operates continuously and detects extensive air showers from the overhead sky. The large field of view and long observation time of Milagro is ideal for surveying the Northern Hemisphere for TeV gamma ray sources. We report on a survey of the region of the Galactic plane visible from the Northern Hemisphere ($30 < 220, -10 < 10$). Four high confidence (> 5 sigma post-trials) and five low confidence gamma-ray sources are identified in the survey.</p>

10:30	<p>Status of the CRTNT Experiment (00h15') <i>S ak : CAO, Zh</i> Two CRTNT telescopes have been installed at Yangbajing, Tibet near the ARGO experiment for test run. Detector construction and test run status will be updated. Telescopes are positioned to at 60 degrees in elevation. Cerekov light from showers above 100TeV is measured and made coincidence with the ARGO experiment. Preliminary result and comparison with simulation will be reported.</p>
10:45	<p>Diffusive Shock Acceleration in Astrophysics (00h15') <i>S ak : MELI, Athi a</i> The role of the diffusive particle acceleration in both non-relativistic and relativistic astrophysical shocks is reviewed and evaluated. We discuss the properties of these shocks and we further present Monte Carlo simulations especially studying the relativistic shocks efficiency in accelerating particles (i.e. protons or electrons) in astrophysical regions such as Super Novae, Active Galactic Nuclei hot spots and Gamma Ray Bursts.</p>

Thursday 21 June 2007

Parallel Session: Neutrino Detection - Sala TeleConferenze Rettorato (09:00-11:00)

time title

09:00	<p>Prototype string for a km3 Baikal neutrino telescope (00h15') <i>S ak : AYNUTDINOV, Vladi i</i> Structure and basic technical parameters of prototype string for a km3 scale Baikal neutrino telescope are presented. The string data acquisition system on the basis of FADC and electronics of new optical modules are described. Results of photodetector studies for prototype string and possibilities to use photomultipliers of different type for a km3 scale Baikal neutrino telescope are discussed.</p>
09:15	<p>Data taking system for NEMO experiment (00h15') <i>S ak : SIMEONE, F a</i> A four-floors prototype of the Nemo towers has been successfully deployed off the Sicily coast in December 2006. The detector is working and data acquisition is going on since then. The aim of this contribution is to give an overview of the NEMO electronic system and to explain the different stages of data acquisition and transport. The underwater electronics sample signals from photomultipliers and acquire slow-control data both from oceanographic instruments and dedicated sensors, allowing to monitor the operational conditions of the apparatus. The whole data are sent to laboratory through a fully bidirectional fiber optic link. On shore the data are received by dedicated boards that distribute them to first level-trigger and to the slow-control system. The NEMO data acquisition/transmission electronic system will be described, properties of acquired signals and of data flow will be discussed.</p>
09:30	<p>High energy muon shower reconstruction (00h15') <i>S ak : MANGANO, Salvat</i> The ANTARES telescope is a large water Cerenkov detector. The aim of the experiment is the detection of cosmic muon neutrinos. They are identified by the muons that are produced in charged current interactions. These muons are detected by the measurement of the Cerenkov light which they emit. Sometimes a high momentum muon produces bremsstrahlung showers. For the first time a method to reconstruct these showers in ANTARES is presented and a comparison of real data and the simulation is shown.</p>
09:45	<p>Point-like source searches with the ANTARES neutrino telescope (00h15') <i>S ak : ZORNOZA, J a -d -Di</i> The ANTARES neutrino telescope is currently under construction in the Mediterranean Sea off the Toulonnaise coast. Since February 2007 five out of the twelve lines are deployed and taking data. The completion of the detector is expected beginning of 2008. For the search for neutrino point-like sources, the excellent angular resolution of ANTARES, better than 0.3 deg above 10 TeV, is an important advantage compared to other neutrino telescopes. In order to maximise the sensitivity it is particularly important to develop efficient search algorithms. In this talk I describe the analysis methods developed by the ANTARES collaboration and their capability in terms of sensitivity and discovery potential.</p>
10:00	<p>Analyses strategies and resent result from AMANDA-II (00h15') <i>S ak : MUENICH, Ki t</i> The primary aim of the Antarctic Muon And Neutrino Detector Array (AMANDA-II) is the search for high-energy neutrinos of extraterrestrial origin. This goal is pursued in different analysis strategies like the search for transient and permanent point sources, for a diffuse signal and for physics beyond the standard model, e.g. the search for WIMPs. In this contribution the different analysis methods and results are presented.</p>
10:15	<p>Cosmic-ray physics with IceCube (00h15') <i>S ak : WALDENMAIER, Til</i> IceCube at the South Pole consists of two components - the IceTop air shower array on the surface and the neutrino telescope at depths from 1450 to 2450 meters below. In its final stage the IceTop detector will consist of 80 stations, each containing two ice Cherenkov tanks, covering a surface of one square kilometer while the neutrino telescope encloses a volume of one cubic kilometer with 4800 photon detectors (digital optical modules or DOMs). Currently 26 IceTop stations and 22 InIce strings are deployed. With the present size of the IceTop array it is possible to measure cosmic rays with energies ranging from 1 PeV to 100 PeV. Coincident events between the IceTop and the InIce detector provide information about the muon content of air showers. Since the number of muons is sensitive to the mass of the primary cosmic ray nucleus these events can be used for cosmic ray composition studies. The current status of IceTop and the ongoing data analysis will be presented.</p>
10:30	<p>Test results of prototype to measure large angle cosmic rays (00h15') <i>S ak : IORI, Ma izi</i> Test results performed with a detector prototype designed to detect Ultra High Energy tau neutrino fluxes and cosmic ray at large zenith angles at High Altitude Research Stations Jungfrauoch (HFSJG) are presented. The scientific motivation for building such a device, the detection principles and technical issues to design and construct it are also discussed.</p>

10:45	<p>Lepton Bundles and Gamma Bursts by Tau AirShowers beyond the edge (00h15')</p> <p><i>Sak : FARGION, Da i l</i></p> <p>UHECR interactions with matter and radiation imply a UHE neutrino astronomy to be soon revealed. Flavor mixing provide the rarest Tau neutrino signals well above atmospheric ones. UHE Tau neutrino scattering inside the Earth would lead to Taus whose decay in flight could be spread in large number and wide area upward in space. Novel signals of Tau air-showering must rise beyond the Mountains and at Earth horizons. Their amplified signature may offer a new road to UHE Neutrino Astronomy. We show the rate, the noise, the signature of such novel air-showers on the edge and how to disentangle their imprint from horizontal UHECR.</p>
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Coffee break - Aula Magna Terrace (11:00-11:30)**Thursday 21 June 2007****Parallel Session: Gamma Detection - Sala TeleConferenze Rettorato (11:30-13:00)**

time title

11:30	<p>Diffuse Gamma Emission of the Galaxy from Cosmic Rays (00h15') <i>S ak : GRASSO, Da i</i> Gamma-rays from pion decay provide a unique tool to probe galactic cosmic rays (CR) and their interaction with the interstellar medium. At the same time, if not well understood, such an emission may be an annoying background for dark matter searching. Therefore, it is necessary to model it as better as possible. We do that by combining new simulations of the CR propagation with recent observations/models of the gas distribution. Our results apply to the ~ 1 GeV - 100 TeV energy range. We found that in the most dense regions of the Galactic Plane our results are in good agreement with EGRET measurements. Then, we model what GLAST and other observatories may find at higher energies (not considering a possible IC component). We compare our predictions with MILAGRO, TIBET and HESS observations in several regions of the sky, including Cygnus and the the Galactic Centre. Finally, we will also briefly discuss the implication of our finding for neutrino astronomy.</p>
11:45	<p>The H.E.S.S. view of the Galactic Centre region (00h15') <i>S ak : VAN ELDIK, Ch i t h</i> The detection of TeV gamma-rays from the direction of the Galactic Centre is one of the most exciting discoveries in recent years. Observations by the H.E.S.S. system of imaging atmospheric Cherenkov telescopes provide the most precise available data on this region in the energy range 150 GeV - 30 TeV. Gamma-rays produced in interactions of energetic particles with ambient material, magnetic fields, or low energy photons have proven an excellent tool to trace the particle accelerators in the sky and to learn about the particles' leptonic or hadronic nature. In particular, the H.E.S.S. discovery of diffuse gamma-ray emission along the Galactic Plane provides strong evidence for a source of hadronic cosmic rays at the centre of the milkyway. In this contribution the H.E.S.S. view of the Galactic Centre region is presented, and possible counterparts of H.E.S.S. sources are discussed.</p>
12:00	<p>H.E.S.S. observations of Active Galactic Nuclei (00h15') <i>S ak : VOLPE, F a a</i> The array of four imaging atmospheric-Cherenkov telescopes HESS has been operating in Namibia since 2003 and during this time it has observed a selected sample of extragalactic gamma-ray emitters in the Very High Energy domain. All the detected sources are Active Galactic Nuclei and almost all belong to class of BL Lac objects. The high sensitivity of HESS allows the detection of faint sources at the level of a few percentage of the Crab flux, yielding a catalogue up to 12 BL Lac. The study of spectra of objects at different redshift is very important to disentangle the intrinsic acceleration mechanisms of the AGN from their absorption by the EBL. A brief overview of AGN in the HESS catalogue will be presented with a particular emphasis on two of the most distant BL Lac 1ES0229+200 and 1ES0347-121, which have recently been detected by HESS. The exceptional flare of PKS2155-304, characterized by the fastest VHE variability ever observed and detected in July 2006, will be also presented.</p>
12:15	<p>MAGIC observations of the HMXB LS I +61 303 in VHE gamma rays (00h15') <i>S ak : JOGLER, T bia</i> MAGIC is currently the largest Imaging Atmospheric Cherenkov Telescope (IACT) of the world and is located at the Canary Island La Palma. Recent observations performed by this high sensitivity instrument discovered the High Mass X-ray Binary (HMXB) LS I +61 303 at VHE gamma rays. The emission from LS I +61 303 was found to be variable, and the source was visible above 100-GeV energies at different runs only during some orbital phases that do not coincide with the periastron passage. Here we report on the results of an accurate analysis of the LS I +61 303 MAGIC observations.</p>
12:30	<p>TenTen: A new array of Cherenkov Telescopes for multi-TeV Gamma-Ray Astronomy (00h15') <i>S ak : ROWELL, Gavi</i> The exciting results from H.E.S.S. point to a new population of gamma-ray sources at energies above 10 TeV, paving the way for future studies and new discoveries in this energy range. Connected with these energies is the origin of particle acceleration to PeV energies and the study of multi-TeV gammaray production in a growing number of astrophysical environments. TenTen is a proposed stereoscopic array (suggested site in Australia) of modest-sized (10 to 20m²) Cherenkov imaging telescopes with wide field of view (8 to 10 deg diameter) optimised for the E \sim10 to 100 TeV range. TenTen will achieve an effective area in excess of 10 km² at energies above 10 TeV. We will outline the motivation of TenTen and summarise key performance parameters.</p>

12:45 Particle acceleration in magnetosphere of collapsing star (00h15')*Speaker: KRYVDYK, Vladimir*

The particles acceleration and their non-thermal emission in the magnetospheres of collapsing stars with the initial dipole magnetic fields and a certain initial energy distribution of charged particles in the magnetosphere are considered. The analysis of particles dynamics and its acceleration in the stellar magnetosphere under collapse show that the collapsing stars can be powerful sources of cosmic rays. The fluxes of cosmic rays from collapsing stars depend on its magnetic field and the initial particle spectrum in the magnetospheres. The collapsing stars can be also powerful sources of non-thermal radiation produced by the interaction of charged particles with the magnetic field. The effect can be observed by means of modern instruments.

Thursday 21 June 2007

Parallel Session: Antimatter detection in space - Aula Magna Rettorato (11:30-13:00)

time title

11:30	<p>Dark matter, cosmological constant and neutrino mixing (00h15') <i>S ak : VITIELLO, Gi</i> The today estimated value of dark energy can be achieved by the vacuum condensate induced by neutrino mixing phenomenon. Such a tiny value is recovered for a cut-off of the order of Planck scale and it is linked to the sub-eV neutrino mass scale. Contributions to dark energy from auxiliary fields or mechanisms are not necessary in this approach.</p>
11:45	<p>Solar and heliospheric cosmic ray observations with PAMELA experiment (00h15') <i>S ak : CASOLINO, Ma</i> PAMELA was launched on June 15th 2006 in a pressurized container on board the Russian Resurs-DK1 satellite. The satellite is flying in high inclination (70°), low Earth Orbit (350-600 km), allowing measurements in various points and conditions of the geomagnetosphere. For its characteristics PAMELA is capable of addressing various items of heliospheric physics. For instance it is capable of performing for the first time a very precise measurement of the high energy component in solar events and to detect directly positrons and neutrons produced in these events. Also long term solar modulation, charge dependent effects, trapped particles and Jupiter electrons will be studied in the three years of expected mission. We will describe the the scientific objectives and observation of trapped and solar particles in its first months of data taking in space.</p>
12:00	<p>The Time-of-Flight system of the PAMELA experiment: in-flight performances (00h15') <i>S ak : CARBONE, Rita</i> The Time-of-Flight (ToF) system is one of the key elements of the PAMELA apparatus, since it must generate the trigger for all the subdetectors and provide, alongside with the magnetic spectrometer, particle identification in the lower part of the explored energy spectrum. The ToF system will be described, with particular attention to its in-flight performances.</p>
12:15	<p>Cosmic-ray Astrophysics with the AMS-02 experiment (00h15') <i>S ak : CARDANO, Fa Ma ia</i> The Alpha Magnetic Spectrometer (AMS), to be installed on the International Space Station, will provide data on cosmic radiations in a large range of rigidity from 0.5 GV up to TV. The main physics goals in the astroparticle domain are the anti-matter and the dark matter searches. AMS offers a unique opportunity to study simultaneously SUSY dark matter in three decay channels from the neutralino annihilation: e+, antiproton and gamma. The expected flux sensitivities in 3 year exposure for the e+/e- ratio, antiproton, antideuterons and gamma rays as a function of energy are presented and compared to other direct and indirect searches.</p>
12:30	<p>Dark Matter Searches with AMS-02 (00h15') <i>S ak : OLIVA, Alb t</i> The AMS-02 experiment is a large acceptance magnetic spectrometer to perform high statistics studies of cosmic rays on the International Space Station for more than 3 years. In this contribution, the AMS-02 expected performances in measuring the nuclear cosmic ray fluxes and their isotopic composition will be presented. AMS-02 will allow to test propagation models through the precise measurements of secondary-to-primary ratios as D/p, 3He/4He in the energy range few hundreds MeV to tens of GeV, and B/C, sub-Fe/Fe up to TV. In particular the original measurements of 10Be/9Be will be performed with high accuracy allowing the understanding of the age of the cosmic-ray confinement and constraint models of the size of the galactic halo.</p>
12:45	<p>Antiproton and Positron Signal Enhancement in Dark Matter Mini-Spikes Scenarios (00h15') <i>S ak : LAVALLE, J li</i> The annihilation of dark matter (DM) in the Galaxy could produce specific imprints on the spectra of antimatter species in Galactic cosmic rays, which could be detected by upcoming experiments such as PAMELA and AMS02. Recent studies show that the presence of substructures can enhance the annihilation signal by a "boost factor" that not only depends on energy, but that is intrinsically a statistical property of the distribution of DM substructures inside the Milky Way. We investigate a scenario in which substructures consist of ~ 100 "mini-spikes" around intermediate-mass black holes. Focusing on primary positrons and antiprotons, we find large boost factors, up to a few thousand, that exhibit a large variance at high energy in the case of positrons and at low energy in the case of antiprotons. As a consequence, an estimate of the DM particle mass based on the observed cut-off in the positron spectrum could lead to a substantial underestimate of its actual value.</p>

Lunch - Aula Magna Terrace (13:00-14:30)**Thursday 21 June 2007****Plenary Session: UHE Cosmic Rays Detection - Aula Magna Rettorato (14:30-16:55)**

time title

14:30	<p>Acceleration and Transport of High Energy Cosmic Rays: A Review (00h25')</p> <p><i>Speaker: BLASI, Paolo</i></p> <p>I will describe the most recent developments in the description of the processes responsible for the acceleration of cosmic rays up to the highest energies. The origin and transport of ultra-high energy cosmic rays will be discussed in tight connection with the related issues of the origin and transport of galactic cosmic rays.</p>
14:55	<p>The origin of galactic cosmic-rays (00h25')</p> <p><i>Speaker: HOERANDEL, J</i></p> <p>The origin of galactic cosmic rays is one of the most interesting unsolved problems in astroparticle physics. A key ingredient in answering this question is to understand the knee in the energy spectrum of cosmic rays. Recent experimental results are presented and their implications on the contemporary understanding of the origin of galactic cosmic rays is discussed.</p>
15:20	<p>Ultra High Energy Cosmic Ray Spectrum Measurement with HiRes Experiment (00h25')</p> <p><i>Speaker: CAO, Zh</i></p> <p>The UHECR energy spectrum above $10^{18.2}$ eV is measured by the HiRes stereo experiment using data taken from December 1999 to November 2006. A fully efficient aperture with minimal weather dependence is defined from $100 \text{ km}^2 \text{ sr}$ (at $10^{18.2}$ eV) to $10000 \text{ km}^2 \text{ sr}$ (at $10^{20.5}$ eV). A clear "ankle" structure is observed at $10^{18.7}$ eV with a confidence level of 99.7%. A GZK feature above $10^{19.7}$ eV is observed as a 4.3 sigma deviation from an extension of a two component power law spectrum.</p>
15:45	<p>Ultra – High Energy cosmic rays: the present status and future prospects (00h30')</p> <p><i>Speaker: WATSON, Al</i></p> <p>Our knowledge about cosmic rays above 10^{19} eV is improving rapidly through the successful operation of the Auger Observatory in Argentina. Reasons for the interest in these rare particles will be explained and the latest data on the energy spectrum, mass composition and arrival directions reported from Auger, HiRes and AGASA will be discussed. The astrophysical implications that might be drawn from the data will be outlined briefly.</p>
16:15	<p>UHECR observation from space: perspectives for next-generation experiments. (00h25')</p> <p><i>Speaker: PETROLINI, Al</i></p> <p>After the Pierre Auger Observatory, it is likely that space-based experiments will be required for next-generation studies of Ultra-High Energy Cosmic Particles. An overview of this challenging task is presented, emphasizing the path and the intermediate steps required to make this perspective a reality.</p>

Coffee break - Aula Magna Terrace (17:00-17:20)**Thursday 21 June 2007****Plenary Session: Antimatter detection in space - Aula Magna Rettorato (17:20-18:40)**

time title

17:20	<p>In-Flight performances of the PAMELA satellite experiment (00h25') <i>Speaker: PAPERINI, Paolo</i> PAMELA (a Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics) is a satellite-borne experiment devoted to measure charged cosmic rays spectra with a particular focus on antiparticle studies. The apparatus is mounted on the polar orbiting Resurs DK-1 satellite and it is collecting data from July 2006. The low geomagnetic cut-off experienced by PAMELA allows to measure low momenta and to investigate phenomena connected with Solar and Earth physics. PAMELA comprises a time-of-flight system, a silicon-microstrip magnetic spectrometer, a silicon-tungsten electromagnetic calorimeter, an anticoincidence system, a shower tail catcher and a neutron detector. The combined information obtained from these devices allows particle identification over a wide energy range. In this talk, the detector design and the in-orbit performances are presented.</p>
17:45	<p>The AMS experiment on the ISS: a particle physics experiment in space (00h25') <i>Speaker: BATTISTON, Roberto</i> Precise knowledge of the hadronic component of cosmic rays is needed to describe the cosmic ray production, acceleration and propagation mechanisms in our galaxy. Present measurements suffer from limitations coming from short exposure time, intrinsic instrumental limitations and restricted energy range. The AMS-02 experiment is a large acceptance magnetic spectrometer to perform high statistics studies of cosmic rays in space. The detector will operate on the International Space Station for more than 3 years from 2009. The status of the experiment is reviewed. AMS-02 will precisely measure the cosmic ray fluxes of individual elements up to $Z \sim 25$ in the rigidity range from $\sim 1\text{GV}$ to $\sim 1\text{TV}$. AMS-02 will allow to test propagation models through the precise measurements of secondary-to-primary ratios as D/p, $3\text{He}/4\text{He}$ in the energy range few hundreds MeV to tens of GeV, and B/C, sub-Fe/Fe up to $\sim 1\text{TV}$. In particular the original measurements of $10\text{Be}/9\text{Be}$ will be performed with high accuracy allowing the understanding of the age of the cosmic-ray confinement and constraint models of the size of the galactic halo. Among the goal of the precision measurement of Cosmic Rays flux and composition by AMS-02 is the measurement for rare components like positrons, and antiprotons, or component never observed before like antideuterons and antinuclei. These measurements could allow to understand cosmic mysteries like the origin of dark matter or the existence of nuclear antimatter.</p>
18:10	<p>Indirect detection of dark matter candidates in gamma-rays (00h25') <i>Speaker: BERGSTRÖM, Lena</i> Soon the GLAST satellite will be launched, and a window will open in energy between 30 and 300 GeV, a range where most of the Weakly Interacting Massive Particles (WIMPs) are predicted to give a signal, if the dark matter halo follows the predictions of N-body simulations. A review of the various candidates and their potential of being detected in gamma-rays is given.</p>

Thursday 21 June 2007**Exhibition of the "Choir of Physics Students" directed by Prof. Paolo Camiz - Aula Magna Rettorato (19:00-20:00)****Thursday 21 June 2007****Conference Dinner - Casa dell'Aviatore (20:30-22:30)**

The conference dinner will be organized at the "Casa dell'Aviatore" located in Viale delle Scienze 2 (<http://www.casaviatore.it/index.php>). This site is about 100m far from the main entrance of University "Sapienza". La Casa dell'Aviatore is the Officers' Club of the Italian Air Force and, in special occasions hosts meetings and congresses. The building is surrounded by a big garden which has an artificial lake and a splendid gazebo where we will dine by candle light. Please note that formal clothes are required (tie for men).

Friday 22 June 2007

Plenary Session: VHE Neutrino Detection - Aula AMALDI (09:00-11:30)

time title

09:00	<p>The BAIKAL neutrino experiment: status, selected physics results, and perspectives (00h25')</p> <p><i>S ak : DJILKIBAEV, Za</i></p> <p>We review the status of the Baikal Neutrino Telescope, which is operating on Lake Baikal since 1998 and has been upgraded to the 10 Mton detector NT200+ in 2005. We present selected physics results on searches for upward going neutrinos, relativistic magnetic monopoles and for very high energy neutrinos. We describe the strategy of creating a detector on the Gigaton (km³) scale at Lake Baikal. First steps of activities towards a km³ Baikal neutrino telescope are discussed.</p>
09:25	<p>IceCube: Recent results and prospects (00h25')</p> <p><i>S ak : DEYOUNG, Ty</i></p> <p>Construction of the IceCube neutrino telescope is now more than 25% complete, with 22 strings in the ice and 26 IceTop air shower stations deployed on the surface. We present initial results from data taken with 9 strings in 2006, as well as results from the AMANDA array, which has been incorporated into IceCube. We also discuss the scientific potential of IceCube as it amasses 1 km³ yr of data over the next few years.</p>
09:50	<p>Recent achievements of the NEMO project (00h25')</p> <p><i>S ak : MIGNECO, E ili</i></p> <p>The NEMO collaboration has conducted in the recent years an intense R&D activity directed at the realization of an underwater km³ detector for high energy neutrinos. The activities have addressed some key issues such as the search and characterization of an optimal deep sea site for the detector installation, the definition of the detector architecture, the design of the detector components and the realization of prototypes. The recent completion of the Phase-1 project with the installation and connection at the LNS Underwater Test Site of a Junction Box and a prototype detector tower has proved the effectiveness of the technological solution proposed as well as a validation of the underwater connection procedure by means of a surface controlled Remotely Operated Vehicle. Preliminary results from the first five months of operation of the apparatus will be presented. The following step will be a Phase-2 project aiming at the realization of a deep sea station at 3500 m depth on the Capo Passero candidate site. The realization of the infrastructure, including the submarine cable and shore station, is under way and will be completed in early 2008. This will be followed by the construction and installation of a full-size detector tower by the end of 2008.</p>
10:15	<p>Data from the ANTARES Neutrino Telescope (00h25')</p> <p><i>S ak : CARR, J h</i></p> <p>Since January 2007 five complete detector lines of the ANTARES deep-sea neutrino telescope have been in successfully operation, making ANTARES the largest neutrino detector in the northern hemisphere. These lines, each housing 75 photomultipliers, are connected to the shore via an undersea cable from the site at a depth of 2470m and the town of La Seyne-sur-Mer in France. The data and long term operation of the ANTARES lines, demonstrate the quality of the ANTARES technology and the advantages of undersea detectors. First data from the operation of the detector with five lines will be presented including candidates for neutrino events. In addition long-term data over more than one year of operation from the first lines of the detector will be presented showing the stability of the system.</p>
10:40	<p>KM3NeT: a next generation neutrino telescope (00h25')</p> <p><i>S ak : DE WOLF, El</i></p> <p>KM3NeT is a Design Study with the primary objective to develop a cost-effective design for a cubic-kilometre sized deep-sea infrastructure to be built in the Mediterranean Sea, housing a neutrino telescope with unprecedented neutrino flux sensitivity at TeV energies. The physics goals and design objectives of the future telescope and the status of the design study, which started in February 2006, will be presented.</p>
11:05	<p>Ultrahigh Energy Neutrinos as Probes of Physics (00h25')</p> <p><i>S ak : SARCEVIC, I a</i></p> <p>Ultrahigh energy (UHE) astrophysical neutrinos that originate in interactions of cosmic rays with the microwave background radiation, or from astrophysical sources such as Active Galactic Nuclei (AGN) and Gamma Ray Bursts (GRBs), provide a unique way of studying astrophysics as well as particle physics. I will discuss what we can learn from UHE cosmic neutrinos. I will show that the effect of neutrino oscillations is production of tau neutrinos which can provide an enhanced signal for the detection of cosmic neutrinos. Furthermore, interactions of UHE cosmic neutrinos could potentially lead to the production of microscopic black holes predicted in theories of extra dimensions, or they may produce supersymmetric charged particles that travel large distances, such as sleptons. I will discuss these processes and their signals in neutrino detectors such as Auger, Anita, IceCube, EUSO and OWL.</p>

Coffee break - Physics Dept. court (11:30-12:00)**Friday 22 June 2007****Plenary Session: UHE Neutrino Detection - Aula AMALDI (12:00-13:15)**

time title

12:00	Cosmic rays and neutrinos from supernova remnants (00h25') <i>Speaker : VISSANI, Fa</i> "The time when Ginzburg and Syrovatsky met HESS and what they told". The VHE gamma ray observations of H.E.S.S. permit direct tests of the hypothesis of Ginzburg and Syrovatskii, that galactic cosmic rays are accelerated in supernova remnants. We discuss how it is possible to use these VHE gamma ray data to deduce the flux of cosmic rays with the minimum theoretical bias (the inverse problem), and the tight relation with the VHE neutrinos from supernova remnants, one of the main targets of the under-water/under-ice neutrino telescopes.
12:25	Acoustic Detection of Ultra High Energy Neutrinos (00h25') <i>Speaker : THOMPSON, L</i> An interesting possible detection mechanism for observing ultra high energy neutrinos is that of acoustic detection. The speaker will introduce this technique and review the current status of research activities in this field across Europe, the US and Russia.
12:50	Radiowave Neutrino Detection (00h25') <i>Speaker : BESSON, Dav</i> We report new results on experiments searching for cosmic neutrino fluxes, including the Antarctic Impulsive Transient Antenna (ANITA) experiment, which completed a 36-day flight of a long-duration balloon payload, in Dec. 2006 - Jan. 2007. We search for impulsive events that could be associated with ultra-high energy neutrino interactions in the ice, and derive limits that constrain several models for ultra-high energy neutrino fluxes.

Lunch break - Physics Dept. court (13:15-14:55)**Friday 22 June 2007****Closing Session and Summary - Aula AMALDI (15:00-17:10)**

time title

15:00	Ultra High Energy Cosmic Rays and Neutrinos (00h30') <i>S ak : STANEV, T d</i> We discuss the the models for cosmic ray acceleration to Ultra High Energy and their possible sources. We concentrate on astrophysical models. We then discuss the propagation of these UHECR from their sources to us and different models that describe the propagation. The last topic is the production of high energy signals (gamma rays and neutrinos) during propagation and the probability for their detection.
15:30	Summary on parallel sessions: "EAS and Gamma Detection" and "Gamma Detection" (00h25') <i>S ak : MORSELLI, Ald</i>
15:55	Summary on parallel sessions: "Neutrino detection" and "Antimatter detection in space" (00h25') <i>S ak : WISCHNEWSKI, Ralf</i>
16:20	Conference Summary (00h45') <i>S ak : GAISSER, Th a</i>