Seminari 2017

Report of Contributions

https://agenda.infn.it/e/12620

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

Heavier and darker: spin-2 dark matter.

Wednesday, 11 January 2017 15:00 (1 hour)

The ghost-free massive spin-2 fields of multimetric extensions of General Relativity turn out to be very perfect
candidates for the observed Dark Matter. I will review the theoretical foundations of bigravity, and outline the qualities
of spin-2 gravitational dark matter.

Presenter: URBAN, Federico (KBFI, Tallin, Estonia)

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

LCDM and beyond: successes and challenges

Wednesday, 18 January 2017 14:30 (1 hour)

In this review talk, I will present the current status of LCDM, the cosmological concordance model, discuss observational challenges and possible theoretical extensions to the standard paradigm.

Presenter: LORENZO, Reverberi (Cosmology and Gravity Group, University of Cape Town (South Africa).)

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

Which technologies can we learn from spiders?

Monday, 30 January 2017 14:30 (1 hour)

In 300 million of years spiders have developed well specialized structures in order to survive to different habitats. For this reason, Evolution has made spiders one of the biggest presence on Earth (overcome only by insects). Apart from the natural history interest, the physics of these structures inspires a lot of smart technologies. In this seminary, an overview of these structures will be shown and the state of the art about the biomimetic field applied to spiders will be explained. In particular hydrophobicity, adhesion to smooth surfaces, sensitivity to small air currents and the exceptional mechanical properties of spider silk are the current focuses of my biomimetic research.

Presenter: GRECO, Gabriele (Universita' di Trento)

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

Signatures of extragalactic Black Holes (BHs) and their comparison with the Galactic ones

Thursday, 2 March 2017 12:00 (1 hour)

I will present details of observations of Galactic and extragalactic Black Hole (BH) sources, interpreting the results in the light of first principles theory of X-ray spectral formation. I will also show that, in the BH case, this theory predicts the spectral index vs. mass accretion rate correlation, with the spectral index which increases and then saturates with the mass accretion rate. This spectral index-mass accretion rate correlation allows us to
estimate BH masses and distance to the source. Using RXTE, Suzaku, ASCA, BeppoSAX and Swift observations, I will present new results on spectral signatures of different types of BHs, like Ultra Luminous X-ray sources (ULXs) such as M101 ULX-1 and ESO 239-HLX1, and Active Galactic Nuclei (AGN) such as BL Lacertae (B2200+420). Moreover, I will show new exciting results on spectral properties of Tidal Disruption Event (TDE) sources and possibility to estimate BH masses in these sources.

Presenter: Prof. TITARCHUK, Lev (Ferrara University)

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

The physics and astrophysics of merging neutron-star binaries

Thursday, 23 March 2017 14:30 (1 hour)

I will argue that if black holes represent one the most fascinating implications of Einstein's theory of gravity, neutron stars in binary system are arguably its richest laboratory, where gravity blends with astrophysics and particle physics. I will discuss the rapid recent progress made in modelling these systems and show how the in spiral and merger of a binary system of neutron stars is more than a strong source of gravitational waves. Indeed, while the gravitational signal can provide tight constraints on the equation of state for matter at nuclear densities, the formation of a black-hole–torus system can explain much of the phenomenology of short gamma-ray bursts, while the the ejection of matter during the merger can shed light on the chemical enrichment of the universe.

Presenter: REZZOLLA, Luciano (Institute of Theoretical Physics, Frankfurt, Germany)

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

New experiment suggestions on high-energy e± radiation and production in crystals

Thursday, 6 April 2017 10:00 (1 hour)

Since 50-th high-energy (GeV-TeV and above) particle interaction with crystals serves a source of the long list on new physical phenomena which can be readily continued in the nearest future. In 80-th the synchrotron-like e± pair production process, close to that in a uniform magnetic field of neutron stars, was predicted and observed at CERN. Pair production in crystals, enhanced by both the synchrotron-like and coherent bremsstrahlung mechanisms, can be used both for the γ-flux suppression in the NA62 experiment and to suggest new types of cosmic γ-telescopes. More QED-related phenomena, such as synchrotron-like dichroism and birefringence, radiative e± self-polarization, production of polarized electron-positron pair will be possible to observe in the framework of the future LHC fixed-target program.
Enhancement of e± radiation by the effect of channeling, above-barrier radiation, radiative cooling and multiple volume reflection by the planes of bent single crystals have been also observed. A drastic enhancement of both radiation and pair production processes in crystals can influence the functioning of both the existing electromagnetic calorimeter of Compact Muon Solenoid and Fermi gamma-telescopes as well as can be applied to devise more effective calorimeters and gamma-telescopes in future.
The coming unique possibility to use Frascati e+ beams will make it possible to observe for the first time both e+ crystal undulator and circularly polarized string-of-strings radiation.

Presenter: TIKHOMIROV, V.V. (Institute for Nuclear Problems, Belarus State University, Minsk)

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

AMS results after 5 years of data taking on the International Space Station

Tuesday, 2 May 2017 14:30 (1 hour)

The Alpha Magnetic Spectrometer (AMS-02) is a particle physics experiment designed to study origin and nature of Galactic Cosmic Rays (CRs) up to TeV energies from space. With its high sensitivity, long exposure and excellent identification capabilities, AMS is conducting a mission of fundamental physics research in space. In particular, the presence of a magnetic field is a unique opportunity to study the anti-particle component of CRs: positrons, anti-protons, anti-deuterium, anti-helium.
After reviewing the propagation of "standard" CRs, new results on lepton ond on anti-proton fluxes will be discussed, as well as their implication in terms of Dark Matter searches. Prospects on future data at TeV energies and forthcoming measurements on rare species, like anti-deuterium and anti-helium, crucial in investigating both the content of Dark Matter and the presence of anti-matter in the Universe, will also be presented.

Presenter: INCAGLI, Marco (PI)

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

Radioactive wastes in SW released by non-nuclear industries

Wednesday, 3 May 2017 11:00 (2 hours)

Phosphoric acid production is an example of the so-called NORM activities. NORM industries imply the presence of significant radioactivity levels before/during/after the production process. This lecture will be focused on an interesting case located at SW of Spain (Huelva city). Radioactive and radiological results will be shown.

Presenter: AGUADO CASAS, Juan Luis (Departamento de Ciencias Integradas, Universidad de Huelva, Spain)

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

Two Nuclear Technology Topics: wastes & accidents (Fukushima)

Thursday, 4 May 2017 14:30 (2 hours)

Electrical power produced by NPP (nuclear power plants) is closely related to two topics of social concern: nuclear wastes and nuclear accidents consequences. This lecture will show briefly: (a) basic concepts about nuclear wastes management challenges; and, (b) radioactive impact and lessons learned after the Fukushima accident (2011).

Presenter: AGUADO CASAS, Juan Luis (Departamento de Ciencias Integradas, Universidad de Huelva, Spain)

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

Basic Physics Teaching: The Physnema Project (Physics & Movies)

Friday, 5 May 2017 09:30 (2 hours)

Teaching Physics is not easy, mainly when first-year college students have not enough Maths/Phys level. Even more, some of them tend to think this subject is "boring"or "useless". Several methodologies could be applied in order to solve this "teaching problem". For instance, the University of Huelva "Physnema Project" uses movie clips to show interesting Physics topics (similar procedures are being studied in different spanish universities such as Oviedo, Granada or Barcelona). This lecture will show some funny Huelva-classroom samples to the audience and, why not, we will discuss about them.

Presenter: AGUADO CASAS, Juan Luis (Departamento de Ciencias Integradas, Universidad de Huelva, Spain)

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

Cinetica di flusso di sfere omogenee attraverso tronchi di cono a parete soffice.

Monday, 15 May 2017 14:30 (1 hour)

Il flusso, indotto per gravità, di una serie di sferette omogenee di varia natura e di diametro d=4-6mm attraverso tronchi di cono a parete soffice, è stato studiato in funzione delle dimensioni del foro di uscita, per diversi valori dell'angolo di apertura del cono. Sono state individuate differenti regioni di cinetica del flusso, delimitate da multipli interi dispari del diametro delle sferette (3d, 5d, 7d, ⋯). In sostanza, si è trovato che la cinetica del flusso è regolata dalla formazione, sul fondo della colonna di materia granulare, di uno strato compatto a struttura esagonale quasi-regolare che agisce come freno al flusso, e dalla sua successiva distruzione ed espulsione dal cono. La sequenza di questi meccanismi ha come conseguenza una modulazione del flusso, che è stata verificata e caratterizzata analizzando il segnale acustico prodotto dalla caduta delle sferette su un microfono e la sua trasformata di Fourier

Presenter: PARRETTA, Antonio (Universita' di Ferrara)

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

Early results from the SPIDER experiment

Wednesday, 17 May 2017 11:30 (1 hour)

SPIDER is a balloon-borne experiment designed to image the polarization of the cosmic microwave background with the aim of constraining models of the early universe. SPIDER was launched on January 1, 2015 and successfully completed a 17-day flight across Antarctica. A subsequent flight is scheduled for December 2018. I will briefly review the experiment, present early results from from SPIDER's first flight, and discuss the implications for future ballooning and satellite missions.

Presenter: GUDMUNDSSON, Jon (Oskar Klein Centre for Cosmoparticle Physics, Stockholm, Sweden)

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

The OVAL experiment: A new experiment to observe vacuum magnetic birefringence with high repetition pulsed magnets

Wednesday, 21 June 2017 11:00 (1 hour)

Vacuum magnetic birefringence (VMB) is a sensitive probe for beyond the Standard Model physics as well as a new verification of QED at low energies. The OVAL experiment (Observing VAcuum with Laser) aims to observe VMB with high repetition pulsed magnets. Our dedicated made pulsed magnet system applies a magnetic field of 9.0 T over a length of 0.17 m with a repetition rate of 0.1 Hz. We combine the magnets with a Fabry-Pérot cavity with a finesse of more than 300,000. An overview of the VMB searching scheme, a description of the magnet system, detailed explanations of the OVAL apparatus, the first result of prototype measurement and a prospect of future OVAL experiment will be given in the seminar.

Presenter: XING, Fan (Department of Physics, University of Tokyo)

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

Dipole Magnetic Moment and CMB Polarization

Tuesday, 4 July 2017 14:30 (1 hour)

In this seminar I will talk about the interaction of cosmic microwave background photons with the magnetic moment of nucleons and electrons at the last scattering surface.
I will show that this secondary effect generates the B-mode polarization by rotating of the direction of the linear E-mode polarization.

Presenter: ZAREI, Moslem ((Department of Physics, Isfahan University of Technology, Iran))

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

First Results from the XENON1T Dark Matter Experiment at LNGS

Wednesday, 12 July 2017 11:00 (1 hour)

We report the first dark matter search results from XENON1T, a~2000 kg dual-phase xenon time projection chamber in operation at the Laboratori Nazionali del Gran Sasso in Italy, the first ton-scale detector of this kind. The blinded search used 34.2 live days of data acquired between November 2016 and January 2017. Inside the (1042±12) kg fiducial mass and in the [5, 40] keVnr energy range of interest for WIMP dark matter searches, the electronic recoil background was (1.93±0.25)x10−4 events/(kg x day x keVee), the lowest ever achieved in a dark matter detector. A profile likelihood analysis shows that the data is consistent with the background-only hypothesis. We derive the most stringent exclusion limits on the spin-independent WIMP-nucleon interaction cross section for WIMP masses above 10 GeV/c2, with a minimum of 7.7 x10−47 cm2 for 35-GeV/c2 WIMPs at 90% confidence level.
In the full nominal 2 t y exposure, we expect to reach with XENON1T a sensitivity of 1.6 x10−47 cm2.
We will also present the future upgrade of the detector, XENONnT, with increased active mass and lower background, to foresee another order of magnitude improvement in sensitivity by 2024.

Presenter: SELVI, Marco (INFN - Bologna)

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

The REDTOP experiment: Rare Eta Decays with a TPC for Optical Photons

Thursday, 13 July 2017 14:30 (1 hour)

The η meson is almost unique in the particle universe since it is a Goldstone boson and the dynamics of its decay are strongly constrained. Because the eta has no charge, decays that violate conservation laws can occur without interfering with a corresponding current. The integrated eta meson samples collected in earlier experiments have been less than ~10^8 events, limiting considerably the search for such rare decays. Only recently, WASA-at-Cosy produced about 10^9 eta, starting to breach into new physics. A new experiment, REDTOP, is being proposed to the scientific community with the intent of collecting more than 10^{13} triggers/year for studies of rare η decays. Such statistics are sufficient for investigating several symmetry violations, and for searches for new particles beyond the Standard Model. The physics program, the accelerator systems and the detector for REDTOP will be discussed during the colloquium.

Presenter: GATTO, Corrado (INFN - Napoli)

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

Recent Cosmological Problems and Primordial Black Holes

Wednesday, 18 October 2017 12:00 (1 hour)

A review is presented on astronomical observations of the last several years, which have discovered that the universe at the red-shfts, z=5 -10, is unexpectedly densely populated by bright galaxies, supermassive black holes (quasars), gamma-bursters, supernovae and is very dusty. It is argued that the origin of these early formed objects do not agree with the conventional theory of their formations.
Moreover, similar and probably related phenomena or objects are abundant in the contemporary universe. In particular, the origin of the observed MACHO's, supermassive black holes (SMBHs) in every large galaxy and even SMBHs in practically
empty space remains mysterious.
All these puzzles are simply and naturally solved in our model of 1993 of massive black hole formationin the early universe. The model predicted log-normal mass distribution of the primordial black holes (PBHs), which became popular in the recent year or two. It explains the puzzling properties of the LIGO-observed gravitational waves and allows for dark matter to be made mostly or solely by PBHs.

Presenter: ALEXANDER, Dolgov (Dip. Fisica e Sicenze della Terra, Universita di Ferrara)

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

Dust-obscured galaxies under the cosmic zoom lens in the Herschel-ATLAS

Wednesday, 18 October 2017 11:00 (1 hour)

The Herschel Astrophysical Terahertz Large Area Survey (H-ATLAS) is the widest-area extragalactic survey undertaken with the Herschel space observatory, covering around 600 square degrees of the sky from far-infrared to sub-millimetre wavelengths. One of its scientific goals is the systematic search of gravitationally lensed dust-obscured galaxies using a simple and efficient method that was first proposed in the 90s, which exploits the steep number counts of sub-mm selected galaxies.
After discussing the importance of gravitational lensing in the study of distant galaxies and the key role played by dust-obscured galaxies in our understanding of galaxy formation and evolution, I will review the status of the search of lensed galaxies in H-ATLAS and of the associated campaign of follow-up multi-wavelength observations.
I will then describe the technique we use to reconstruct the intrinsic morphology of the background galaxies from the observed lensed images and I will show its application to both imaging and interferometric data.
The talk is meant for a wide audience so please come along even if you are not very familiar with far-infrared/sub-mm astronomy and/or gravitational lensing.

NB: seminario avrà un tono divulgativo e sarà quindi adatto sia a chi lavora nel campo dell'astrofisica che agli interessati di qualsiasi altro settore (studenti compresi)

Presenter: NEGRELLO, Mattia (Cardiff University)

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

Il prisma di Newton visto da vicino: effetti delle riflessioni multiple interne

Tuesday, 17 October 2017 15:00 (1 hour)

Gli esperimenti di dispersione della luce bianca eseguiti da Newton con i prismi rimangono tra i più belli della fisica e vengono replicati costantemente nelle scuole e nelle università. Ma c'è un aspetto che non sempre viene considerato, e cioè che la luce rifratta la prima volta all'interno del prisma equilatero, oltre che essere ulteriormente rifratta e dar luogo, in uscita, al ben noto fascetto disperso, è anche riflessa internamente un numero indefinito di volte e, in seguito ad ogni riflessione, produce un fascetto rifratto esterno che può essere bianco o disperso a seconda della parità del numero di riflessioni subite. In questa presentazione analizzo, sia teoricamente che sperimentalmente, tutti i fascetti uscenti dal prisma in due situazioni diverse: i) illuminando il prisma con un fascetto laser polarizzato ''s" o ''p"; ii) illuminando il prisma con un fascetto bianco polarizzato ''s" o ''p"

Presenter: PARRETTA, Antonio (Dipartimento di Fisica - UniFe)

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

The Cosmic Origin of Silver and Gold

Tuesday, 24 October 2017 15:00 (1 hour)

Both Silver and Gold are primarily produced via the rapid neutron capture process. For many years this process has been associated with supernova explosions, because only there the necessary conditions in terms of temperature, matter density and neutron fluences could be realized, it was felt. In more recent times also the partial disruption of close, binary neutron stars during their coalescence to a black hole, has been considered as a possible formation site for the heaviest r-process elements. These expectations are now confirmed from the recent discovery of a kilonova associated to the event GW170817, result of the coalescence of a two neutron stars. The arguments for (and against) models with multiple formation routes for the observed Solar system r-process abundancies will be discussed

Presenter: LUND, Niels (DTU Space (Denmark))

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

Arrival and Welcome

Thursday, 23 November 2017 11:55 (5 minutes)

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

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

LIGO-Virgo: from the first detection to multi-messenger astronomy

Thursday, 23 November 2017 12:00 (25 minutes)

Presenter: LOSURDO, Giovanni (INFN Pisa (Virgo collaboration))

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

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

The electro-magnetic afterglow of GW170817 a.k.a GRB170817A

Thursday, 23 November 2017 12:45 (25 minutes)

Presenter: GUIDORZI, Cristiano (Dipartimento di Fisica e Scienze della Terra – UniFe)

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

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

Lunch break

Thursday, 23 November 2017 13:30 (1 hour)

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

Contribution ID: **24** Type: **not specified**

Modeling neutron star mergers

Thursday, 23 November 2017 14:30 (25 minutes)

Presenter: DE PIETRI, Roberto (Dipartimento di Fisica, UniParma)

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

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

New insights on nuclear physics from neutron star mergers

Thursday, 23 November 2017 15:15 (25 minutes)

Presenter: DRAGO, Alessandro (Dipartimento di Fisica e Scienze della Terra – UniFe)

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

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

Discussion

Thursday, 23 November 2017 12:25 (20 minutes)

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

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

discussion

Thursday, 23 November 2017 13:10 (20 minutes)

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

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

discussion

Thursday, 23 November 2017 14:55 (20 minutes)

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

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

discussion

Thursday, 23 November 2017 15:40 (20 minutes)

Session Classification: mini-workshop Gravitational-Wave Astrophysics Day

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

What can we learn on fundamental physics using cosmological data?

Friday, 10 November 2017 11:00 (1 hour)

I will introduce the problem of dark energy in cosmology. I will then show related forecasts for future constraints on scale-dependent parametrizations of galaxy bias and their impact on the estimate of cosmological parameters from the power spectrum of galaxies measured by spectroscopic redshift surveys. Aiming at assessing the impact of the bias I will show results from Fisher matrix analyses, adopting two different parametrizations of scale-dependent bias. Finally, I will assess the impact od assuming an incorrect bias model and show how the systematic errors induced are larger than the expected statistical ones. In the last part of the talk I will give some ideas about deep learning algorithms and how they can help us in studying astrophysical images.

Presenter: MENENGONI, Eloisa (Universita' la Sapienza di Roma)

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

Pulsar glitches and neutron star masses

Wednesday, 29 November 2017 17:30 (1 hour)

Pulsar glitches, sudden jumps in frequency in otherwise steadily spinning down pulsars, offer a glimpse into the superfluid interior of neutron stars.
Within the accepted scenario these timing irregularities are explained in terms of an instability of the superfluid vortices that permeate the crustal region of the star. We propose a method to constrain the mass of glitching pulsars, using observations of the maximum glitch observed in a star, together with state of the art microphysical models of the pinning interaction between superfluid vortices and ions in the crust.
By using a simplified model for the angular momentum reservoir of pinned vorticity we find a general inverse relation between size of the maximum glitch and the pulsar mass. This procedure procedure will allow current and future observations of glitching pulsars to constrain the physics of glitch models and pinning forces.

Presenter: ANTONELLI, Marco (Dipartimento di Fisica dell' Universita' degli Studi di Milano)

Contribution ID: **32** Type: **not specified**

On the Deflection of High-Energy Charged Particles by Means of Bent Crystals

Monday, 27 November 2017 16:00 (1 hour)

If a high-energy charged particle penetrates through a crystal having a small angle ψ between its momentum and one of the main crystallographic axes (z-axis), correlations between successive collisions of the particle with neighboring atoms may occur. In this case motion of the particle is defined by the continuous potential of atomic strings. In this potential particle motion in the plane (x, y) that is orthogonal to the z-axis can be finite (axial channeling) or infinite (above-barrier motion). If the crystal is bent both axial channeling and above-barrier motion may cause a deflection of the direction of motion of the particle. The main advantage of such deflection of high-energy charged particle in comparison with deflection in the field of electromagnet is compact sizes of the bent crystal. Strong intra-crystalline field provides an opportunity to deflect charged particles by means of crystals with a thickness of several centimeters. The main point of this seminar is the analysis of the optimal conditions for negatively charged particle beam deflection by means of a bent crystal and the dependence of the probability of close collisions in a bent crystal on the orientation of the crystal.

Presenter: KIRILLIN, Igor (Akhiezer Institute of Theoretical Physics, Kharkov, Ucraine)

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

The effective number of neutrinos: standard and non-standard calculations

Thursday, 30 November 2017 14:30 (1 hour)

The contribution of radiation, i.e. relativistic particles, to the total cosmological energy density is usually parameterized with the so-called effective number of neutrinos (N_eff). Present cosmological observations, in particular the CMB data from the Planck satellite, lead to a quite restricted allowed range for this parameter, that includes its standard value: N_eff=3. In this talk, I will review how the effective number of neutrinos is defined in the early Universe and describe some cosmological scenarios where its value is not 3, including the effect of non-instantaneous neutrino decoupling and flavour oscillations, as well as more exotic possibilities such as a very low-reheating case or the potential presence of neutrino-electron non-standard interactions. In these scenarios, the value of N_eff can be above or below 3, a situation that will be very constrained by data from cosmological observations in the near future.

Presenter: PASTOR, S (IFIC Valencia)

Contribution ID: **34** Type: **not specified**

The vacuum-birefringence search at BMV

Tuesday, 5 December 2017 11:30 (1 hour)

In physics, vacuum has historically been defined as a region of space where light travels at the well-known calculated constant, c. In the early 20th century, the quantization of electromagnetism led to the development of the now well-tested theoretical framework of quantum electrodynamics (QED). An interesting, yet untested, prediction of QED is the non-constant, even anisotropic, propagation of light through vacuum. The origin of this anisotropy is that, in contrast to classical vacuum, QED vacuum can be polarized in the presence of an external electromagnetic field resulting in a birefringent vacuum, nvac.
The leading experiments in the field, PVLAS (Polarizzazione del Vuoto con LASer; Ferrara, Italy)and BMV (Birefringence Magnetique du Vide; Toulouse, France), seek to measure this effect experimentally by observing the ellipticity induced in a linearly polarized laser field propagating through a region of birefringent vacuum. The BMV experiment, housed at the Laboratoire National des Champs Magnetique Intenses (LNCMI) in Toulouse, France, utilises high-amplitude (B 20T) pulsed magnetic fields in its efforts to measure vacuum polarization.
The main challenge of the experiment lies in reaching the sensitivity required to measure the minute birefringence, nvac = kvacB2, resulting from the small magnetic-birefringence constant of vacuum (kvac 4 × 10−24 T−2) predicted by QED; a number which, as a result of the recent advancements in state-of-the-art precision interferometry owing largely to the successes of interferometric gravitational-wave detectors, is increasingly viable. The BMV collaboration seeks to accomplish this goal on two fronts: first, through collaboration with the LNCMI facility in the implementation of novel magnet technologies for signal production; and second, through the development and characterization of an ultra-precise polarimeter for signal detection. Here we present the status of the BMV experiment and the perspectives for the near future.

Presenter: BATTESTI, Rémy (Laboratoire National des Champs Magnetiques Intenses, Toulouse, France)

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

The Imaging X-ray Polarimetry Explorer (IXPE): a break-through in High Energy Astrophysics

Thursday, 14 December 2017 10:00 (1 hour)

The Imaging X-ray Polarimetry Explorer (IXPE) has been selected by NASA as the next SMEX (Small Explorer) mission to be flown in 2021. It will perform imaging polarimetry resolved in energy and time. IXPE is a break-through in High Energy Astrophysics promising to 're-open', after 40 years, the window in X-ray astronomy to measure directly the geometrical parameters of many different classes of sources eventually breaking possible degeneracies in theoretical models. It will be capable of producing the first X-ray polarization maps of extended astrophysical sources such as Pulsar Wind Nebulae and Super-Nova Remnants. Additionally, it will probe vacuum birefringence effects in systems with magnetic fields far larger than those reachable with experiments on Earth. The payload of IXPE comprises three identical telescopes with mirrors provided by MSFC/NASA. The focal plane is provided by ASI with IAPS/INAF responsible for the overall instrument that includes detector units that are provided by INFN. ASI also provides, in kind, the Malindi Ground Station. LASP is responsible for the Mission Operation Center while the Science Operation Center is at MSFC. The operation phase will last for at least two years.

Presenter: FABIANI, Sergio (INAF - IAPS (Roma))

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

Probing flavour oscillations with neutrino telescopes

Wednesday, 6 December 2017 15:00 (1 hour)

Neutrino oscillations experiments have measured the flavour oscillation parameters to high precision. Neutrino oscillations can be a probe for new physics, especially at the very high energies now reached by Large Volume Neutrino Telescopes (LVNTs), such as IceCube and KM3NeT. Although originally the main purpose of LVNTs was not to determine flavour oscillation parameters, they can help constraining the values of the atmospheric angle and squared mass difference. Very soon, ORCA and PINGU, with their increased sensitivity to the oscillation parameters, will luckily also help in determining the neutrino mass ordering and constraining the octant of the atmospheric angle. In this talk I will discuss the role of LVNTs in the determination of atmospheric parameters, and I will present a beyond the standard model scenario that can be constrained by LVNTs observations.

Presenter: FERNÁNDEZ, Pablo (IFIC - Valencia)

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

Spin wave dynamics at the edge of configurational Ferro to AntiFerro transitions in macrospin chains

Tuesday, 12 December 2017 14:30 (1 hour)

We investigate the configurational antiferro- to ferro- magnetic (AF-F) transitions, triggered by an applied field, in macrospin chains from a dynamical perspective.
By means of the dynamical matrix approach, we calculate the spin wave frequency and profile across these transitions, and show the occurrence of soft modes and their role in the transition.
We show how the soft mode dispersion relation changes at the edge of the transition.
We discuss the possibility of occurrence of the opposite (F-AF) transition in either simulated or experimental investigations, and introduce a defected system to attain that task

Presenter: KUŹMA, Mgr Inż. Dominika (Institute of Nuclear Physics of the Polish Academy of Sciences, Cracow (Poland) (within the joint PhD Programme Cracow-Ferrara))

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

GW170817 and the beginning of the multimessenger era

Thursday, 21 December 2017 14:00 (1 hour)

The detection of the first GW signal from a compact binary merger compatible with a binary neutron star (BNS), and of its electromagnetic counterparts marked the beginning of the multimessenger astronomy era.
This detection has confirmed that the merger of a BNS is a unique laboratory for physics at the extreme, where all fundamental interactions play a key role. In this talk, after a broad introduction on the phenomenology of BNS mergers, I will focus on the role of weak interactions during the merger. I will show how the EM counterpart can be modelled using a multi-component, anisotropic model, where matter properties are sensitive to neutrino-matter interactions. Moreover, I will show how the combined information deduced from the GW and EM signals can significantly constrain the properties of the NS matter EOS, in a genuine multi essenger approach.

Presenter: PEREGO, Albino (Dipartimento di Fisica, Università degli Studi di Milano Bicocca)