

seminari 2019

Report of Contributions

Contribution ID: 1

Type: **not specified**

Cosmology with Gaussian process: inferring late-time expansion, implications for H_0 and q_0 . (RINVIATO A DATA DA DEFINIRE)

Thursday, 17 January 2019 11:30 (1 hour)

GP has been a popular “model-independent” method, utilised to reconstruct the low-redshift cosmic expansion history, henceforth the dynamics of the late-time evolution. In this talk, I will present an extension of the standard Gaussian Process formalism, the Multi-Task GP with the ability to perform joint learning of several “low-redshift” cosmological data and on the robustness of several assumptions involved. Utilising the “low-redshift” expansion-rate we obtain constraints on $H_0 = 68.52 \pm 0.94$ (stat) ± 2.51 (sys) km/s Mpc⁻¹ and a corresponding $r_d = 145.61 \pm 2.82$ (stat) ± 4.3 (sys) Mpc. Subsequently, one can further constrain $q_0 = -0.52 \pm 0.06$ and the transition redshift $z_T = 0.64^{+0.12}_{-0.09}$. Using the $\Omega_m(z)$ diagnostic, we find that the concordance model is very consistent within the redshift range $z < 2$ and mildly discrepant for $z > 2$. While GP provides flexibility, it can also lead to biases and incorrect inferences which become more apparent, for higher order derivatives.

Presenter: HARIDASU, Sandeep (Universtita di Tor Vergata)

Contribution ID: 3

Type: **not specified**

A view of the ProtoDUNE Single-Phase experiment at the CERN Neutrino Platform

Monday, 11 February 2019 15:00 (1 hour)

After some years of planning and two intense years of engineering, fabrication, assembly, installation, and as much commissioning as feasible, the prototype for the single-phase liquid argon detector for the DUNE experiment, ProtoDUNE SP, has been completed, and has been exposed to beam from a new SPS beam line during Fall 2018.

I will give some examples of the technical challenges addressed by this, the largest liquid argon time projection chamber ever constructed, the solutions adopted, and some initial data on some aspects of the performance of the apparatus.

Presenter: GAMBERINI, Enrico (CERN Fellow)

Contribution ID: 4

Type: **not specified**

Performances of Lobster Eye Optics and Their calculation.

Monday, 4 February 2019 15:00 (1 hour)

The grazing incidence lobster eye X-ray optics is introduced. The main advantage of this concept is large field of view. Two methods of calculation of its performances are presented. First, it is a numerical method based on simplified ray-tracing. The other method is an analytical method of direct calculation of effective collecting length. Results of tests of lobster eye prototypes are shown.

Presenter: TICHY, Vladimir (Leicester University)

Contribution ID: 5

Type: **not specified**

Neutrinos from a blazar jet and the birth of non-stellar neutrino astronomy

Thursday, 4 April 2019 16:00 (1 hour)

IceCube has recently reported the discovery of high-energy neutrinos of astrophysical origin, opening up the PeV (10^{15} eV) sky. These observations are challenging to interpret on the astronomical side and have triggered a fruitful collaboration across particle and astro-physics. I will discuss the very recent association between high-energy IceCube neutrinos and the blazar TXS 0506+056, reporting on how this result fits with the work done by our group over the past five years. I will then present the “big picture”, explain why this association is very important for astronomy, and discuss some very recent results on the nature of TXS 0506+056. The talk is self-contained, requires no previous knowledge of neutrinos or blazars, and has been prepared for a very broad audience (astronomers and physicists).

Presenter: PADOVANI, Paolo (ESO)

Contribution ID: 7

Type: **not specified**

Atomic scale metrology

Wednesday, 6 March 2019 16:30 (1 hour)

The activity is focused on the measurement of the (220) lattice plane spacing of silicon by means of combined optical and X-ray interferometry - COXI, which is one of the most advanced tools for atomic-scale displacement metrology. The aim is to determine the spacing of the (220) lattice planes in silicon to within 1 ppb relative uncertainty.

Presenter: MASSA, Enrico (Istituto Nazionale di Metrologia)

Contribution ID: 8

Type: **not specified**

Recent progress in the physics of neutron stars and black holes

Thursday, 28 March 2019 14:00 (1 hour)

I will review the rapid recent progress made in modelling neutron stars in binary system and the associated gravitational-wave emission. In particular, I will discuss how our understanding on the maximum mass and radii of neutron stars has improved with the detection of GW170817. In addition, I will illustrate how the properties of magnetised accretion flows onto black holes represent the ideal tool to understand the properties of matter in strong gravitational fields and to explain the phenomenology of accreting supermassive and stellar-mass black holes. More specifically, I will review the modelling these flows not only onto rotating black holes in general relativity, but also on other more exotic compact objects. These comprise black holes in alternative theories of gravity, but also horizonless compact objects with and without a surface.

Presenter: REZZOLLA, Luciano (Chair of Theoretical (Relativistic) Astrophysics and the Director at the Institute for Theoretical Physics (ITP) of the Goethe University of Frankfurt, Germany.)

Contribution ID: 9

Type: **not specified**

The HERMES Project (High Energy Rapid Modular Ensemble of Satellites): Probing Space-time Quantum Foam and Hunting for Gravitational Wave Electromagnetic Counterpart

Tuesday, 26 March 2019 15:00 (1 hour)

I discuss how several of the proposed models for space-time quantization predict an energy dependent speed for photons.

Although the predicted discrepancies with the general speed of light are minuscule, I discuss how it is possible to detect this intriguing signature of space-time granularity with a new concept of modular observatory for photons in the energy band from few keV to few MeV.

This observatory may consist of a swarm of micro/nano-satellites on low orbits. Sub-microsecond time resolution and wide energy band allows to probe tiny energy dependent delays, expected to be the signature of the granular structure of space-time in several of the proposed theories of Quantum Gravity.

Moreover this kind of experiment allows to perform temporal triangulation of high signal to noise impulsive events with positional accuracies of few arcseconds, making an observatory like that a promising hunter for the elusive electromagnetic counterparts of Gravitational Waves.

Presenter: BURDERI, Luciano (Universita di Cagliari)

Contribution ID: 10

Type: **not specified**

Radiative-transfer effects: a new scale in the bias expansion

Wednesday, 27 March 2019 11:30 (1 hour)

The fact that the spatial nonlocality of galaxy formation is controlled by some short length scale like the Lagrangian radius is the cornerstone of the bias expansion for large-scale-structure tracers.

However, the first sources of ionizing radiation between $z \approx 15$ and $z \approx 6$ are expected to have significant effects on the formation of galaxies we observe at lower redshift. These radiative-transfer effects introduce a new scale in the clustering of galaxies, i.e. the mean free path of ionizing radiation.

This mean free path can be very large, of order 100 Mpc/h. Consequently, higher-derivative terms in the bias expansion could turn out to be non-negligible even on these scales: treating them perturbatively would lead to a massive loss in predictivity and, for example, could spoil constraints on the neutrino mass.

I discuss under what assumptions an explicit non-perturbative model of radiative transfer can maintain the robustness of large-scale galaxy clustering as a cosmological probe.

Presenter: CABASS, Giovanni (Max Planck Institute for Astrophysics, Garching, DE)

Contribution ID: 11

Type: **not specified**

Hydrodynamic transport in graphene

Wednesday, 20 March 2019 11:00 (1 hour)

Electron-electron (e-e) collisions can impact transport in a variety of surprising and sometimes counterintuitive ways. Despite strong interest, experiments on the subject proved challenging because of the simultaneous presence of different scattering mechanisms that suppress or obscure consequences of e-e scattering. Only recently, sufficiently clean electron systems with transport dominated by e-e collisions have become available, showing behavior characteristic of highly viscous fluids. Examples of these new and counterintuitive measurable phenomena are the negative nonlocal resistance, the occurrence of current whirlpools, and the superballistic transport through a constriction. Furthermore, it is well known that materials subjected to a magnetic field exhibit the Hall effect, a phenomenon studied and understood in fine detail. Here, we report a qualitative breach of this classical behavior in electron systems with high viscosity. The viscous fluid in graphene is found to respond to non-quantizing magnetic fields by producing an electric field opposite to that generated by the classical Hall effect.

Presenter: PELLEGRINO, Francesco (Universita' di Catania)

Contribution ID: 12

Type: **not specified**

Revelations from 2 km Underground: Neutrinos from the Sun and Earth

Wednesday, 3 April 2019 15:00 (1 hour)

Neutrinos are mysterious particles that barely interact with our detectors. Yet physicists have pursued the challenge of neutrino detection for the past few decades in search of physics beyond the Standard Model...and succeeded to unlock the secrets of solar neutrinos – discovering the phenomenon of neutrino oscillations. One of the key experiments in this effort was the Sudbury Neutrino Observatory (SNO), located 2 km underground in a deep mine in Canada. After the end of the SNO experiment, the detector has been modified into a low-background liquid scintillator detector called SNO+. SNO+ will continue to probe the nature of neutrinos from the Sun and, in addition, will detect geo neutrinos, becoming the third detector in the world with this capability. This talk will tell the story of the discovery of solar neutrino oscillations with SNO and will show how the experiment has been transformed into SNO+, which is poised to start taking data with scintillator in the near future.

Presenter: CHEN, Mark (Queen's University, Kingston, Ontario, Canada)

Contribution ID: 13

Type: **not specified**

ESO Press Conference on First Result from the Event Horizon Telescope (EHT)

Wednesday, 10 April 2019 14:30 (3h 20m)

streaming of the ESO press conference presenting a groundbreaking result from the EHT.
<https://www.eso.org/public/announcements/ann19018/>

Prima del collegamento il Prof. Rosati farà una breve introduzione alle misure del BH nel centro galattico, dove la strumentazione ESO VLT ha giuocato un ruolo centrale negli ultimi ~15 anni, fino a questa dell'EHT

Presenter: ROSATI, Piero (Dipartimento FST Unife)

Contribution ID: 14

Type: **not specified**

Neutrino-nucleus coherent scattering: new physics, experiments and applications.

Thursday, 11 April 2019 11:00 (1 hour)

After its discovery in 2017, there is a large and growing interest in the coherent elastic neutrino-nucleus scattering (CEvNS): experiments are being conceived and funded worldwide to probe neutrinos from a variety of sources, perform precision measurements and search for new physics. At the same time, thanks to the large cross-sections the process can achieve, applications for non-proliferation purposes are highly promising.

In this talk I will discuss the physics of CEvNS, review the current experimental efforts and present some possibilities for an INFN involvement in the field.

Presenter: MARCO, Vignati (INFN Roma 1)

Contribution ID: 15

Type: **not specified**

GW170817: lessons from the first observation of a binary neutron star merger

Thursday, 9 May 2019 14:30 (1 hour)

The historically first detection of gravitational waves from a binary neutron star merger turned out to be a treasure trove for the dense matter physics, relativistic astrophysics, testing the theories of gravity and to emerging multi-messenger astronomy. I will summarize the multi-messenger results related to the GW170817 event, discuss implications of this observation and the future outlook.

Presenter: BEJGER, , Michal (Nicolaus Copernicus Astronomical Center (CAMK), Warsaw.)

Contribution ID: 16

Type: **not specified**

Welcome and Short introduction

Tuesday, 11 June 2019 10:00 (10 minutes)

Presenter: ROSATI, Piero (Dipartimento FST Unife)

Session Classification: The Hubble constant day @UniFE

Contribution ID: 17

Type: **not specified**

Determination of the Hubble constant through CMB observations of the Planck satellite

Tuesday, 11 June 2019 10:45 (30 minutes)

Presenter: LATTANZI, Massimiliano (FE)

Session Classification: The Hubble constant day @UniFE

Contribution ID: 18

Type: **not specified**

The distance scale ladder and the Hubble constant

Tuesday, 11 June 2019 10:10 (30 minutes)

Presenter: DELLA VALLE, Massimo (Capodimonte Astronomical Observatory, INAF-Naples)

Session Classification: The Hubble constant day @UniFE

Contribution ID: 20

Type: **not specified**

Cosmological applications of time-varying sources strongly lensed by galaxies and galaxy clusters

Tuesday, 11 June 2019 11:40 (30 minutes)

Presenter: GRILLO, Claudio (Universita' di Milano)

Session Classification: The Hubble constant day @UniFE

Contribution ID: 21

Type: **not specified**

Deriving the Hubble constant using Planck and X ray observations of galaxy clusters

Tuesday, 11 June 2019 12:15 (30 minutes)

Presenter: MAZZOTTA, Pasquale (ROMA2)

Session Classification: The Hubble constant day @UniFE

Contribution ID: 22

Type: **not specified**

H0 measurement from gravitational waves and their electro-magnetic counterparts

Tuesday, 11 June 2019 14:00 (30 minutes)

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

Session Classification: The Hubble constant day @UniFE

Contribution ID: 23

Type: **not specified**

Beyond LCDM: plausible solutions to the H0 tension

Tuesday, 11 June 2019 14:35 (30 minutes)

Presenter: ARCHIDIACONO, Maria (INFN - Bologna)

Session Classification: The Hubble constant day @UniFE

Contribution ID: 24

Type: **not specified**

Final Discussion

Tuesday, 11 June 2019 15:10 (20 minutes)

Session Classification: The Hubble constant day @UniFE

Contribution ID: 25

Type: **not specified**

An overview of the BESIII Experiment

Wednesday, 22 May 2019 14:30 (1 hour)

The BESIII experiment, Beijing, P.R.C. will be described. The spectrometer is active in the e^+e^- storage ring BEPCII, which is a charm- t factory. The machine is in fact optimized for the study of the mass range of the charmonium-charm states, where several expected and unexpected bound states have been discovered in the last decade, the so-called XYZ states. BESIII was one of the main actors in these discoveries and recently it accumulated the largest J/ψ dataset, with 10 billion events. A selection of the obtained results in this and other areas of study, with particular attention to the Italian contribution to them, will be given. The next upgrades to the accelerator and the detector will be also addressed.

Presenter: LAVEZZI, Lia (Institute of High Energy Physics, Beijing PRC)

Contribution ID: 26

Type: **not specified**

Searching the electromagnetic counterparts of gravitational wave sources

Thursday, 6 June 2019 15:00 (1 hour)

The recent discovery of the electromagnetic counterpart of the gravitational wave (GW) source GW170817 associated with a binary neutron star merger, has demonstrated the extraordinary informative power of multi-messenger observations. For this reason, huge efforts have been devoted in the observing campaigns aimed at searching the electromagnetic counterparts of GW sources. I will review the main observational properties of the expected electromagnetic counterparts, the strategies currently applied for successfully joint GW and electromagnetic radiation detections, highlighting the most important results obtained so far as well as the exciting challenges for the next years.

Presenter: STRATTA, Giulia (INAF Bologna)

Contribution ID: 27

Type: **not specified**

Experiences and Challenges in three decades of Airborne Gamma Spectrometry in Switzerland

Friday, 21 June 2019 11:00 (1 hour)

Presenter: BUCHER, Benno (Ispettorato Federale della Sicurezza Nucleare - Svizzera)

Contribution ID: 28

Type: **not specified**

From multi-messenger observations to the neutron stars equation of state

Tuesday, 24 September 2019 14:30 (1 hour)

Using a Bayesian approach, we combine measurements of neutron star macroscopic observables obtained by astrophysical and gravitational observations, to derive joint constraints on the equation of state (EoS) of matter at supranuclear density. In our analysis we use two sets of data:

- (i) the masses and tidal deformabilities measured in the binary neutron star event GW170817, detected by LIGO and Virgo;
- (ii) the masses and stellar radii measured from observations of nuclear bursts in accreting low-mass X-ray binaries. Using two different parametrizations of the equation of state, we compute the posterior probability distributions of the EoS parameters, using which we infer the posterior distribution for the radius and the mass of the two neutron stars of GW170817. The constraints we set on the radii are tighter than previous bounds.

Presenter: FASANO, Margherita (Universita' di Roma)

Contribution ID: 29

Type: **not specified**

Fluorescenza X per medaglioni metallici rinascimentali

Monday, 14 October 2019 15:00 (1 hour)

I medaglioni rinascimentali raffiguranti gli imperatori romani Nerone e Vespasiano, che adornano il Palazzo Properi Sacrati, in Corso Ercole d'Este, a Ferrara, sono stati duplicati e venduti tanto tempo fa. Una coppia di medaglioni è stata rinvenuta presso un collezionista, che ha chiesto autorizzazione all'esportazione al fine di venderli all'asta. La tecnica XRF è stata usata per identificare i medaglioni autentici e le copie e le sorprese non sono mancate.

Presenter: PETRUCCI, Ferruccio (FE)

Contribution ID: 30

Type: **not specified**

Dmitrii Mendeleev: The Periodic Table of Elements and Beyond

Monday, 4 November 2019 16:00 (1 hour)

150 years ago Dmitrii Ivanovich Mendeleev (1834-1907), then a young chemistry professor in St. Petersburg, formulated his version of the system of elements. The choice of date is somewhat arbitrary, as there were five other attempts at periodic tables postulated earlier in the 1860s, some of which resemble our present version slightly more than Mendeleev's in certain respects. Also, the main achievement of Mendeleev's table —its predictive capacity —was also a gradual process that began in 1869 but took several decades to cement his international reputation. In this talk I will explore what Mendeleev did in 1869, how it related to what came before and after, and also discuss a few of the myths that have accumulated around his work and his personality. Mendeleev's work on the periodic law of chemical elements will be presented in a broader perspective of his Nature-Philosophy views and works, which include theory and investigations of solutions, such as alcohol in water, studies of rarified gases and discovery of supercritical fluids.

Presenter: SHILTSEV, Vladimir (Fermi National Accelerator Laboratory (Batavia, IL, USA))

Contribution ID: 31

Type: **not specified**

Spettroscopia per Immagini per la conservazione dell'Arte Contemporanea

Thursday, 31 October 2019 14:30 (1 hour)

Il problema della conservazione di opere d'arte è particolarmente sentito per i manufatti di Arte Contemporanea, che, realizzati con i materiali più diversi, sembrano refrattari alle consolidate prassi di conservazione e persino di diagnostica. La Spettroscopia per Immagini, nata negli anni 90 con la grande diffusione degli apparecchi di imaging elettronico, si candida come diagnostica di elezione per questo e altri casi: vedremo perchè.

Presenter: PETRUCCI, Ferruccio (FE)

Contribution ID: 32

Type: **not specified**

Galactic constraints on fermionic dark matter

Thursday, 28 November 2019 15:00 (1 hour)

It is presented a model of dark matter at galactic scales based on neutral, massive fermions, at finite temperatures and in thermodynamic equilibrium within a general relativistic framework. The salient features of the density distribution are presented and are discussed in the context of galactic observables: total dark matter content and density profile, rotation curves in the case of the Milky Way and other galaxy types from dwarf to big ellipticals. Fermion masses in the range 10-100 keV are shown to be preferable by observational data. Recent developments on the intriguing possibility that a concentration of these dark matter fermions at the center of galaxies can work as an alternative to the supermassive black hole hypothesis are also discussed.

Presenter: RUEDA, Joerge (ICRANet & Dip. Fisica UniFe)

Contribution ID: 33

Type: **not specified**

Artificial Intelligence meets Neutron Stars

Thursday, 7 November 2019 15:00 (1 hour)

In this talk, I will present a short overview of my work on the modeling of neutron stars' equation of state. In particular, I will introduce the many-body forces model (MBF), and its applications on the description of twin stars and magnetic neutron stars. On the second part of the talk, I will discuss about artificial intelligence techniques and how they can be used to constrain the equation of state of nuclear matter.

Presenter: DE OLIVEIRA GOMES, Rosana (Frankfurt Institute for Advanced Studies (FIAS) Frankfurt am Main, Germany)

Contribution ID: 34

Type: **not specified**

3D printed physical breast phantoms for X-ray breast imaging

Tuesday, 12 November 2019 10:00 (1 hour)

The growth of 3D printing technologies in the last years has been very rapid. 3D printing is an innovative technique for fabricating a wide range of different objects starting from 3D models. Novel materials and new printing techniques are being developed, so new applications are emerging. The medical physics team of the University of Naples Federico II have recently started a project for virtual clinical trials in 2D and 3D X-ray breast imaging starting from digital breast phantoms. An aspect of this project consist of manufacturing physical versions of digital phantoms using 3D printers. Many 3D printing technologies exist today: we use the common Fused Deposition Modelling (FDM), a technique where a thermoplastic material is first melted and after extruded onto a support plate in order to create the individual layer of the model.

Patient-like 3D physical phantoms are needed to produce a realistic tissue background pattern in the images, important for the investigation of the detectability of lesions, in the dose estimations procedures, in the assessment of the performance of image processing algorithms and reconstruction algorithms.

Presenter: DI FRANCO, Francesca (INFN and univ. of Naples Federico II)

Contribution ID: 35

Type: **not specified**

Study of the resonances $K_0^*(700)$, $\psi(4040)$ and $X(3872)$ in the framework of effective models.

Friday, 29 November 2019 11:30 (1 hour)

Our aim is to understand some conventional and non-conventional mesons by using an effective QFT models. Starting from a single $q\bar{q}$ seed state in the Lagrangian some states appear as a dynamically generated companion poles. We show that $K_0^*(700)$ is a companion pole of the heavier $K_0^*(1430)$ resonance, $X(3872)$ emerges as a virtual companion pole of $\chi_{c1}(2P)$, and the puzzling $Y(4008)$ is not a real state but an enhancement which appears when studying the state $\psi(4040)$.

Presenter: PIOTROWSKA, Milena (University of Kielce, Poland)

Contribution ID: 36

Type: **not specified**

Device composed by chemoresistive sensors for colorectal cancer preventive screening

Wednesday, 11 December 2019 15:00 (1 hour)

Colorectal cancer (CRC) is a worldwide diffused pathology for both men and women. However, if promptly diagnosed, it is also one of the most curable tumor types, with a curability rate of about 90% at stage I. For this specific reason, an efficient preventive screening is fundamental to avoid its degeneration. The test currently adopted by Italian National Health Service (NHS), and in other countries, as mass population screening is fecal occult blood test (FOBT). In Ferrara, the immunochemical version of this test (FIT) is performed since 2005 every two years on subjects from 50 to 69 years old and shows a huge percentage of false positives (about 65% according to the analyzed data). FIT positives are then invited to undergo colonoscopy. The device SCENT A1 (patented in Italy, UK and Germany), is capable of performing a non-invasive analysis of fecal samples, recognizing the tumor presence by their odor. Their odor is in fact different from fecal samples of healthy subject, due to tumor biomarker contamination. These biomarkers are volatile organic compound produced by tumor-affected cells by mechanisms as peroxidation or metabolic alterations. The clinical validation outcomes of a protocol that involved University of Ferrara, AUSL-FE, Ospedale S. Anna (Cona) and SCENT S.r.l., lasted for about three years (May 2016-July 2019), are presented here, alongside with a description of the device structure and functioning, chemoresistive sensors mechanisms and a detailed delineation of clinical validation protocol lines. More than 500 subjects, resulted positives to FIT, have adhered to the study and colonoscopy has been used as gold-standard. Each patient brought a sample of frozen feces to be analyzed by SCENT A1, before colonoscopy preparation. Data have been analyzed with an algorithm, specifically realized by employing techniques as principal component analysis and support vector machine. Sensitivity and specificity of SCENT A1 resulted to be 84,1% and 82,4% respectively, showing the high potentialities of this test, if employed on FIT-positives, of reducing of about two thirds the FIT false positives and so, non-operative colonoscopies (performed on healthy subjects).

Presenter: ZONTA, Giulia (University of Ferrara)

Contribution ID: 37

Type: **not specified**

Cosmic Magnetism and the CMB (Rimandato a data da definire)

Friday, 6 December 2019 14:30 (1 hour)

Relic magnetic fields generated in the primordial Universe may represent the seeds for the generation of the magnetic fields observed today on cosmological scales in galaxies, clusters, filaments and voids.

Such Primordial Magnetic Fields (PMFs) can be generated through different mechanisms in the early Universe and their presence and characteristics would represent a peculiar probe of the fundamental physics in the early Universe like during inflation and phase transitions.

Magnetic fields generated prior to recombination leave unavoidable imprints on the Cosmic Microwave Background which represents the best lab to investigate the nature of primordial magnetism.

After presenting the observational and theoretical scenario of cosmic magnetism and the relevance of PMFs, I'll describe the main imprints of PMFs on CMB anisotropies with particular interests for the E and B polarizations.

I will then show the most updated constraints on PMFs from Planck 2018 data and the forecasts for LiteBIRD and its combination with ground based CMB experiments.

Presenter: PAOLETTI, Daniela (INAF Bologna)

Contribution ID: 38

Type: **not specified**

Solar neutrino spectroscopy with Borexino

Thursday, 12 December 2019 14:30 (1 hour)

Borexino is a 280ton liquid scintillator detector placed at the Laboratori Nazionali del Gran Sasso in Italy. Since the start of its data taking in May 2007, it has provided several measurements of solar neutrinos, important for the understanding of our star, as well as of the neutrino properties. In particular, Borexino has performed the first spectroscopic measurements of the pp, ${}^7\text{Be}$, and pep solar neutrinos, the measurement of the ${}^8\text{B}$ neutrinos with the 3 MeV energy threshold and has provided the best current limits on the CNO solar neutrinos and on the effective neutrino magnetic moment. The seminar will describe the latest comprehensive measurement of the pp-chain solar neutrinos based on the Phase-2 data with significantly lowered radioactive background. The potential of Borexino to measure solar neutrinos from the CNO fusion cycle will be also discussed.

Presenter: LUDHOVA, Livia (Forschungszentrum Jülich, Institute for Nuclear Physics, Jülich)

Contribution ID: 39

Type: **not specified**

The power of Love

Wednesday, 18 December 2019 15:30 (1 hour)

Gravitational wave observations of merging binaries have opened a new window onto the nature of the most dense objects of our Universe.

In this talk we will discuss how tidal interactions affects the evolution of coalescing systems, leaving the imprint of the body's internal composition on the emitted gravitational wave signal.

We will show how observations by current and future interferometers will be able to constrain such signature, providing new information on the behavior of matter in extreme regimes. Moreover we will discuss the possibility of using tidal interactions to discriminate among families of exotic compact objects, leading to smoking gun evidences of new physics.

Presenter: MASELLI, Andrea (Sapienza University of Rome)

Contribution ID: 40

Type: **not specified**

WOW: a World Of Wearables Smart garments and body sensor networks for cardiovascular monitoring

Wednesday, 18 December 2019 11:00 (1 hour)

This seminar will present the experience of the WeSTLab (Wearable Sensors and Telemedicine Lab, Fondazione Don Gnocchi, Milan) in developing wearables for cardiovascular monitoring. Over the years different types of wearable have been designed by the Lab, from sensorized garments to a body sensor network allowing the simultaneous measure of up to 32 signals from different body sites. These systems have been used for the assessment of cardiac performance in patients, jet fighter pilots, alpinists and astronauts aboard the International Space Station. Following the laboratory tradition, the hardware development has been complemented by significant efforts in terms of signal processing to derive innovative parameters of physiological and clinical interest from the collected signals. An example is represented by the beat-by-beat estimation of indexes of cardiac contractility and relaxation from the measure of the thorax micro-accelerations (the seismocardiogram) produced by the beating heart.

Presenter: DI RIENZO, Marco (Dept. of Biomedical Technology, IRCCS Fondazione Don Carlo Gnocchi, Milano)