

# **Exotic Phenomena of Gauge Theory**

## **Report of Contributions**

Contribution ID: 5

Type: **not specified**

## **Study of medium effects on heavy-flavor production at RHIC**

*Thursday, 4 June 2015 16:50 (30 minutes)*

**Presenter:** Dr LIM, Sanghoon (Yonsei Univ.)

**Session Classification:** Afternoon - Plenary (1st day)

Contribution ID: 7

Type: **not specified**

## Variational method for X(3872)

*Friday, 5 June 2015 09:00 (30 minutes)*

**Presenters:** PARK, Aaron (Yonsei Univ.); Dr PARK, Woosung

**Session Classification:** Morning - Plenary (2nd day)

Contribution ID: 8

Type: **not specified**

## **Models of neutrino mass generation and collider signatures**

*Friday, 5 June 2015 09:30 (1 hour)*

**Presenter:** Prof. KANG, Sinkyu (Seoul Tech)

**Session Classification:** Morning - Plenary (2nd day)

Contribution ID: 9

Type: **not specified**

## **Development of a QMD-type model code for heavy-ion collisions at low and intermediate energies**

*Friday, 5 June 2015 10:45 (30 minutes)*

**Presenter:** Dr KIM, Kyungil (IBS, Rare Isotope Science Project)

**Session Classification:** Morning - Plenary (2nd day)

Contribution ID: 10

Type: **not specified**

## Heavy quark system in external field

*Friday, 5 June 2015 11:15 (1 hour)*

**Presenter:** Prof. LEE, Su Hounng (Yonsei University)

**Session Classification:** Morning - Plenary (2nd day)

Contribution ID: 12

Type: **not specified**

## **Student Seminars I**

*Friday, 5 June 2015 15:00 (1 hour)*

**Session Classification:** Afternoon - Plenary (2nd day)

Contribution ID: 13

Type: **not specified**

## **B $\rightarrow$ D(\*) tau nu and top-quark FCNC processes within general two-Higgs doublet model**

*Friday, 5 June 2015 16:15 (30 minutes)*

**Presenter:** Dr YUAN, Xing-Bo (Yonsei Univ.)

**Session Classification:** Afternoon - Plenary (2nd day)

Contribution ID: 15

Type: **not specified**

## **Colloquium: New messages from the sky on physics BSM**

*Friday, 5 June 2015 17:15 (1 hour)*

**Presenter:** Prof. PARK, Seongchan (Sungkyunkwan University)

**Session Classification:** Afternoon - Plenary (2nd day)

Contribution ID: 16

Type: **not specified**

## **Hadron production in heavy ion collisions**

*Saturday, 6 June 2015 09:00 (1 hour)*

**Presenter:** Prof. CHO, Sungtae (Kangwon National U)

**Session Classification:** Morning - Plenary (3rd day)

Contribution ID: 17

Type: **not specified**

## **Student Seminars II**

*Saturday, 6 June 2015 10:00 (1 hour)*

**Session Classification:** Morning - Plenary (3rd day)

Contribution ID: **18**

Type: **not specified**

## Summary and Outlook

*Saturday, 6 June 2015 11:20 (1 hour)*

**Presenter:** Prof. KIM, C. S. (Yonsei University)

**Session Classification:** Morning - Plenary (3rd day)

Contribution ID: 19

Type: **not specified**

## Poster Presentations I

*Thursday, 4 June 2015 19:00 (1 hour)*

**Session Classification:** Poster session

Contribution ID: 20

Type: **not specified**

## Poster Presentations II

*Friday, 5 June 2015 19:00 (1 hour)*

**Session Classification:** Poster session

Contribution ID: 21

Type: **not specified**

## **Research presentation and in-depth discussions (1)**

*Saturday, 6 June 2015 14:00 (1 hour)*

**Presenter:** Mr MIN, KyeongHyeon (Yonsei Univ.)

**Session Classification:** Special session on particle physics phenomenology

Contribution ID: 22

Type: **not specified**

## **Research presentation and in-depth discussions (2)**

*Saturday, 6 June 2015 15:00 (1 hour)*

**Presenter:** Mr LEE, HooChan (Yonsei Univ.)

**Session Classification:** Special session on particle physics phenomenology

Contribution ID: 23

Type: **not specified**

## **Research presentation and in-depth discussions (3)**

*Saturday, 6 June 2015 16:00 (1 hour)*

**Presenter:** Mr LEE, DongHoon (Yonsei Univ.)

**Session Classification:** Special session on particle physics phenomenology

Contribution ID: 24

Type: **not specified**

## **Research presentation and in-depth discussions (4)**

*Saturday, 6 June 2015 17:00 (1 hour)*

**Presenter:** Mr KANG, MoonJeong (Yonsei Univ.)

**Session Classification:** Special session on particle physics phenomenology

Contribution ID: 25

Type: **Talk**

## B $\rightarrow$ X<sub>s</sub> $\gamma$ study using hadronic tagging method

We present an inclusive study on the measurement of the branching fraction of the radiative B meson decay B  $\rightarrow$  X<sub>s</sub>  $\gamma$ , using the full data sample collected with the Belle detector at the KEKB asymmetric-energy  $e^+e^-$  collider, corresponding to  $753 \times 10^6$   $B\bar{B}$  pairs. One of the B mesons in the  $\Upsilon(4S) \rightarrow B\bar{B}$  decay is fully reconstructed in hadronic modes, and the radiative photon is sought in the decay of the other B meson. We plan to obtain the CP asymmetry and the isospin asymmetry according to the measured photon energy spectrum.

**Primary authors:** KIM, Hanjin (Yonsei Univ.); Prof. KWON, Youngjoon (Yonsei Univ.)

**Presenter:** KIM, Hanjin (Yonsei Univ.)

Contribution ID: 26

Type: **Talk**

## Highlights of recent Belle physics results

*Thursday, 4 June 2015 14:00 (1 hour)*

In this talk, we present recent highlights of the physics results from the Belle experiment. This includes the new measurements on  $B \rightarrow D^{(*)} \tau \nu$  decays which can have significant implications for physics beyond the Standard Model such as 2HDM(II). In addition, we will discuss new results on dark sector search from Belle and other related results.

**Primary author:** Prof. KWON, Youngjoon (Yonsei University)

**Presenter:** Prof. KWON, Youngjoon (Yonsei University)

**Session Classification:** Afternoon - Plenary (1st day)

Contribution ID: 27

Type: **Talk**

## Recent highlights of LHC/CMS results

*Friday, 5 June 2015 14:00 (1 hour)*

This year the LHC resumed its operation running at unprecedented 13 TeV energy in the center-of-mass frame. In this talk, we will present the status of new LHC operation as well as a few selected preliminary physics results from the CMS experiment.

**Primary author:** Prof. YOO, Hwidong (Seoul National University)

**Presenter:** Prof. YOO, Hwidong (Seoul National University)

**Session Classification:** Afternoon - Plenary (2nd day)

Contribution ID: 28

Type: **Talk**

## Nonleptonic B Meson Decay in the Perturbative QCD approach

*Thursday, 4 June 2015 17:20 (30 minutes)*

Using perturbative QCD approach, charmless  $B_{u,d,s} \rightarrow VT$  decays are predicted. Their branching ratios, polarization fractions and direct CP violations are calculated. Within this approach the polarization fractions and the branching ratios of  $B \rightarrow \phi(K_2^{*-}, \bar{K}_2^{*0})$  agree with the observed experimental data. However, the branching ratios of  $B \rightarrow \omega(K_2^{*-}, \bar{K}_2^{*0})$  cannot be explained, where the polarization fractions can be accommodated. The tree dominated channels with a vector meson emitted have longitudinal polarization fraction of 90%, while the penguin dominating ones have subtle polarization fractions. Fortunately, most branching ratios of  $B_{u,d}$  decays are of the order  $10^{-6}$ , which would be straight forward for experimental observations. For the  $B_s$  decays, the branching ratios can reach the order of  $10^{-6}$  in a vector emitted tree dominated decays. However, in penguin dominated decays those are of order of  $10^{-7}$  which need more experimental data to be observed.

**Primary author:** Dr SIMANJUNTAK, Freddy (Yonsei Univ.)

**Presenter:** Dr SIMANJUNTAK, Freddy (Yonsei Univ.)

**Session Classification:** Afternoon - Plenary (1st day)

Contribution ID: 29

Type: **Talk**

## Tau neutrino physics in SHiP

*Thursday, 4 June 2015 15:00 (30 minutes)*

A new fixed target experiment at CERN, SHiP is planned to search for the hidden particles using charmed mesons produced with 400 GeV proton beam. This experiment is also ideal for the study of tau neutrinos.

I will present the cross section and the fluxes of the tau neutrinos and antineutrinos from the decay of the charmed meson,  $D_s$ . Also, I will discuss the estimation of the detectable events in this experiment.

**Primary author:** Dr JEONG, Yuseon (Yonsei Univ.)

**Presenter:** Dr JEONG, Yuseon (Yonsei Univ.)

**Session Classification:** Afternoon - Plenary (1st day)

Contribution ID: 30

Type: **Talk**

## Variational Method for X(3872)

Using the variational method, we calculate the mass of heavy tetraquark states in a nonrelativistic potential model with color confinement and spin hyperfine interaction. We investigate the stability of tetraquark states containing a heavy quark and an antiquark. We find that the lowest energy states just corresponds to the sum of the hadronic final states to which the X(3872) can decay.

**Primary author:** Mr PARK, Aaron (Yonsei University)

**Co-authors:** Prof. LEE, Su Houng (Yonsei University); Dr PARK, Woosung (Yonsei University)

**Presenter:** Mr PARK, Aaron (Yonsei University)

Contribution ID: 35

Type: **Talk**

## Heavy Ion Simulation using Geant4

RAON is the heavy ion accelerator of the Rare Isotope Science Project (RISP), which is carried by Institute for Basic Science (IBS) in Korea. As its name shows, RISP has the plan to produce rare isotopes and RAON is their key item of the plan.

Geant4 is the toolkit for the simulation of the passage of particles through matter. Using Geant4, plenty types of experiments could be run with the Monte-Carlo based simulation.

This Research is the validation of the simulation of the experiment which is planned for RAON. The simulation of the collision between Uranium-238 and liquid Hydrogen target is compared to the experiment data from the paper written by J. Taieb et al..

**Primary author:** LEE, Chan Young (Yonsei University)

**Presenter:** LEE, Chan Young (Yonsei University)

Contribution ID: 37

Type: **Talk**

## Nuclear symmetry energy in QCD phase

In dense quark phase, one can imagine two situations. Normal quark phase and color superconducting phase. For the normal phase, the quark matter symmetry energy can be obtained from hard dense loop(HDL) resummed grand potential. It reduces symmetry energy. In superconducting phase, symmetry energy becomes almost 3 times of one for the normal matter as the degree of freedom reduces to 1/3 of the normal matter. We expect that the reduction of symmetry energy by HDL becomes vanishing in 2SC phase as the rest mass can not be asymmetricized as in normal phase. Updated results will be presented.

**Primary author:** Mr JEONG, Kie Sang (Yonsei Univ.)

**Presenter:** Mr JEONG, Kie Sang (Yonsei Univ.)

Contribution ID: 38

Type: **Talk**

## Renormalization of dimension 6 gluon operators

We identify the independent dimension 6 twist 4 gluon operators and calculate their renormalization in the pure gauge theory. By constructing the renormalization group invariant combinations, we find the scale invariant condensates that can be estimated in nonperturbative calculations and used in QCD sum rules for heavy quark systems in medium.

**Primary author:** Mr KIM, HyungJoo (Yonsei Univ.)

**Co-author:** Prof. LEE, Suhoung (Yonsei univ.)

**Presenter:** Mr KIM, HyungJoo (Yonsei Univ.)

Contribution ID: 39

Type: **Talk**

## Weak nonleptonic decays of $\Omega_c^0$ baryon to axial-vector meson

*Thursday, 4 June 2015 15:30 (30 minutes)*

The axial-vector-emitting weak hadronic decays of the  $\Omega_c^0$  baryon are investigated. After employing the factorization and the pole model framework to predict their branching ratios, we derive the symmetry-breaking effects on axial-vector-meson-baryon couplings and effects of flavor dependence on baryon-baryon weak transition amplitudes and, consequently, on their branching ratios.

**Primary author:** Dr DHIR, Rohit (Yonsei Univ.)

**Presenter:** Dr DHIR, Rohit (Yonsei Univ.)

**Session Classification:** Afternoon - Plenary (1st day)

Contribution ID: 40

Type: **Talk**

## Triplet Dark Matter from leptogenesis

*Friday, 5 June 2015 16:45 (30 minutes)*

A triplet dark matter candidate from the thermal leptogenesis is considered with building a model. The model is based on the standard two Higgs doublet model and seesaw mechanism with Higgs triplets. The parameters (couplings and masses) are adjusted for the observed small neutrino mass and the leptogenesis. Dark matter particles can annihilate and decay in this model. The time evolution of dark matter number is governed by (co)annihilations in the expanding universe, and its mass is constrained by the observed relic density. The dark matter can decay into final states with three leptons (two charged leptons and one neutrino). We investigate whether the decay in galaxy can account for cosmic ray anomalies in the positron and electron spectrum. A noticeable point is that if the dark matter decays into each lepton with different branching ratios, cosmic ray anomalies in AMS-02 measurements of the positron fraction and the Fermi LAT measurements of the electrons-plus-positrons flux could be simultaneously accounted for from its decay products.

**Primary author:** Dr HEO, Jae Ho (Yonsei Univ.)**Presenter:** Dr HEO, Jae Ho (Yonsei Univ.)**Session Classification:** Afternoon - Plenary (2nd day)

Contribution ID: 41

Type: **Poster**

## QCD sum rules for sigma hyperons in nuclear matter

Reproducing the paper(Jin, Xue-Min et al. Phys.Rev. C51 (1995) 347), We calculate the wilson coefficients of operator product expansion(OPE). Through this calculation, we will Study outline of the method, dispersion relation, operator product expansion(OPE), Borel transform, and propagator.

**Primary author:** Mr GUE, Giju (Hardron physics)

**Presenter:** Mr GUE, Giju (Hardron physics)

Contribution ID: 42

Type: **Talk**

## Rare Isotope Science Project

There are many atoms from Hydrogen to Livermorium(116). But in the nature, the largest atom is Uranium(92). From Neptunium(93), large and heavy atoms should be made artificial, combining two atoms, and going larger and heavier, the atom cannot stand longer and easily broken(fission). This is same as neutron, in isotopes. When the number of neutron is much less or more than proton in a atom, the atom is easily broken also.

The fusion, fission processes which explain the fusion of two atoms and the fission of heavy atom are used, and have some relations between the number of proton, neutron and the mechanism.

There is not only periodic table which lists the atoms by the number of proton, but also a table of nuclides which lists all of atoms from heavy atom to isotopes related to the number of protons and neutrons. When looking the table of nuclides, interesting things can be found that there are a states which the atom is (relatively) stable at the specific numbers of protons and neutrons, called Magic Number. These numbers can be derived by using specific potential well, with spherical harmonic oscillators and the spin-orbit coupling.

**Primary author:** Mr CHUNG, Minhyuk (Yonsei University)

**Presenter:** Mr CHUNG, Minhyuk (Yonsei University)

Contribution ID: 43

Type: **Poster**

## Diquark Sum Rules for Exotic Baryons

We want to calculate the masses of  $\Lambda(1405)$  and  $N(1535)$  through the diquark sum rules with the interpolating field proposed by the diquark cluster picture for the penta-quark components in baryons. According to the paper, International Journal of Modern Physics A Vol. 21, No. 27 (2006), B. S. Zou, the penta-quark components could be dominant for some excited baryons and the diquark cluster picture for the penta-quark components in baryons also gives a natural explanation for the longstanding mass-reverse problem of  $N(1535)$ ,  $N(1440)$  and  $\Lambda(1405)$  resonances as well as the unusual decay pattern of the  $N(1535)$  resonance.

**Primary author:** Mr NOH, Sungsik (Yonsei University)

**Presenter:** Mr NOH, Sungsik (Yonsei University)

Contribution ID: 44

Type: **Talk**

## Dalitz Plot Study of $B^+$ to $\pi^+ \pi^0 \pi^0$ at Belle

We present the Dalitz plot study on  $B^+ \rightarrow \pi^+ \pi^0 \pi^0$  decay mode. We use Monte Carlo simulated samples based on a data sample of 711 fb<sup>-1</sup> collected at the  $\Upsilon(4S)$  resonance energy, recorded by KEKB asymmetric-energy e<sup>+</sup>e<sup>-</sup> collider.

**Primary author:** Mr KIM, Kyungho (Yonsei Univ.)

**Presenter:** Mr KIM, Kyungho (Yonsei Univ.)

Contribution ID: 45

Type: **Talk**

## Standard model and concepts of supersymmetry

Standard model is almost complete. In last 2013, we found higgs boson and we can explain many physical phenomena to use standard model. But the standard model was not perfect because there are so many things that we cannot explain. For example, those are about dark matter, dark energy, gravity etc. Therefore we need some more comprehensive models and the theory of supersymmetry is the most adequate thing among them. So in my presentation, I will explain some topic about supersymmetry including the relation between SM and SUSY, the basic concepts of SUSY, the particles consisting of SUSY, and also the Minimal Supersymmetry Standard Model which is the concrete model of SUSY.

**Primary author:** Mr MIN, KyeongHyeon (Yonsei Univ.)

**Presenter:** Mr MIN, KyeongHyeon (Yonsei Univ.)

Contribution ID: 46

Type: **Talk**

## The 3-3-1 Models and Implications to Astroparticle Physics

*Thursday, 4 June 2015 16:20 (30 minutes)*

We study two versions of 3-3-1 model. The minimal 3-3-1 model behaved as the simple 3-3-1 model with the replication of  $\eta$  or of  $\chi$  can provide realistic dark matter candidates. The relic density is figured out as a function of the dark matter mass by using micrOMEGAS package. In addition, the 3-3-1 model with neutral fermions can be extended into 3-3-1-1 model by considering the lepton number as a local symmetry. We show that the 3-3-1-1 model can generate inflation as well as explain the baryon asymmetry of the Universe successfully.

**Primary author:** Ms THUY, Nguyen Thi (Yonsei Univ.)

**Presenter:** Ms THUY, Nguyen Thi (Yonsei Univ.)

**Session Classification:** Afternoon - Plenary (1st day)

Contribution ID: 47

Type: **Poster**

## **General relativity and Non-Abelian gauge theory**

Introduce an intuitive way of understanding the underlying differential geometrical structure behind general relativity and look over the structural analogy between general relativity and Non-Abelian gauge theory

**Primary author:** Mr LEE, DongHoon (Yonsei Univ.)

**Presenter:** Mr LEE, DongHoon (Yonsei Univ.)

Contribution ID: 48

Type: **Poster**

## Searching dark sector in rare B decay

Find dark sector in  $Y(4S)$  resonance.  $\Upsilon^0$  decays into two vector particles, and the vector particles decay into lepton pair, electron and muon pair. The vector particle has mass  $< 2.6\text{GeV}$ , half of  $\Upsilon^0$ . This is signal MC and generic MC study.

**Primary author:** Mr PARK, Seokhee (Yonsei Univ.)

**Presenter:** Mr PARK, Seokhee (Yonsei Univ.)

Contribution ID: 49

Type: **Poster**

## **Cosmic Rays Observed by COREA Prototype System at the North Side of Seoul**

The COREA(COSmic ray Research and Education Array) collaboration has installed a prototype array of plastic scintillation systems at Kyeonggibuk Science High School and Hansung Science High School to study cosmic ray events. In each site, three detector stations are installed, where each station consists of four scintillation detectors. In this presentation, we report coincidence technique based on time information to detect high-energy air showers and analysis of features of cosmic ray data correlated with solar flare.

**Primary author:** Mr CHO, Woo-Ram (Yonsei Univ.)

**Presenter:** Mr CHO, Woo-Ram (Yonsei Univ.)

Contribution ID: 50

Type: **Poster**

## Study of $B^0 \rightarrow l^+ \tau^-$ using untagged method at Belle

The lepton-flavor-violating B decays  $B^0 \rightarrow l^+ \tau^-$  ( $l = e, \mu$ ) are forbidden in the Standard Model (SM) in the absence of nonzero neutrino masses, but can occur via one-loop diagrams if neutrino oscillations are included. In this presentation, suppression of background using Neural Network and signal sensitivity and expected upper limit will be presented. In addition, systematic uncertainty will be presented a little bit.

**Primary author:** Ms SOHN, YoungSoo (Yonsei University)

**Presenter:** Ms SOHN, YoungSoo (Yonsei University)

Contribution ID: 51

Type: **Talk**

## Search for massive invisible particle $X^0$ in $B^+ \rightarrow e^+ X^0$ and $B^+ \rightarrow \mu^+ X^0$ decays

We present a search for a non-Standard-Model particle  $X^0$  in the mass range 0.1-1.8 GeV/c in  $B^+ \rightarrow e^+ X^0$  and  $B^+ \rightarrow \mu^+ X^0$  decays. The results are obtained from a 711 fb<sup>-1</sup> data sample collected at the Y(4S) resonance, with the Belle detector at the KEKB energy asymmetric  $e^+ e^-$  collider. One B meson is fully reconstructed in a hadronic mode to enable the precise analysis of the signal decay's lepton in the recoiling partner B meson. We find no evidence of a signal and upper limits of branching fractions are set.

**Primary author:** Mr PARK, Chan Seok (Yonsei Univ.)

**Presenter:** Mr PARK, Chan Seok (Yonsei Univ.)

Contribution ID: 52

Type: **Poster**

## The Conceptual Introduction to Black Holes

The talk is about the very familiar, but only a little known astronomical object, the black holes. They could be mostly described classically by Schwarzschild metric, from which almost every property of them would be derived. We focus on the introduction to concepts, especially about the observable phenomena. We can identify black holes in two different kinds by whether rotating one or not. There are three parameters describing the macroscopic phenomena of rotating black holes, mass, electric charge, and angular momentum, which would be dealt in the talk in detail. Hawking radiation, essentially non-classical phenomenon would be introduced in the final step.

**Primary author:** Mr KANG, MoonJeong (Yonsei Univ.)

**Presenter:** Mr KANG, MoonJeong (Yonsei Univ.)