The 13th International Workshop on e+e- collisions from Phi to Psi

Report of Contributions

https://indico.ihep.ac.cn/e/17032

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

Study of charmonia at Belle

Wednesday, 17 August 2022 19:30 (25 minutes)

The large data sample accumulated by the Belle experiment at the KEKB asymmetric-energy e^+e^- collider provides a unique opportunity to study charmonium(-like) states. We report new results on the $X(3872)$ decays to $J/\psi\omega$ and $\pi^+\pi^-\pi^0$ final states, as well as other studies involving charmonia. We also present a search for double-heavy tetraquark states $X_{cc\bar{s}\bar{s}}$ decaying into $D_s^{(*)}D_s^{(*)}$ final states.

Category

talk

Primary author: PATRA, Sourav (IISER Mohali)

Presenter: PATRA, Sourav (IISER Mohali)

Session Classification: Session 3

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

Charmed baryons at Belle

Monday, 15 August 2022 15:10 (30 minutes)

We report new measurements on charmed baryon spectroscopy and decays performed using data collected by the Belle experiment at the KEKB asymmetric-energy e^+e^- collider. The talk covers the test of lepton-flavor universality conducted in $\Omega_c \to \Omega\ell\nu$, and studies involving other Λ_c and Ξ_c decays. Other recent results on charmed baryons from Belle are also reported.

Category

talk

Primary author: GAO, Xuyang (Fudan University)

Presenter: GAO, Xuyang (Fudan University)

Session Classification: Session 1

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

Studies of light hadrons at Belle

Tuesday, 16 August 2022 13:30 (25 minutes)

The large data sample recorded by the Belle experiment at the KEKB asymmetric-energy e^+e^- collider is very useful for studying light baryons or mesons. We report the observation of $\Omega(2012)^- \to \Xi(1530)^0 K^-$ as well as of a narrow structure in $\Lambda_c^+ \to pK^-\pi^+$. We also discuss about the determination of resonant parameters of $\phi(1680)$ using the initial-state radiation process $e^+e^- \to \eta\phi$. Other recent results on hadron spectroscopy from Belle are also covered in the talk.

Category

talk

Primary author: LI, Yang (Fudan University)

Presenter: LI, Yang (Fudan University)

Session Classification: Session 1

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

Hadron studies using two-photon processes from Belle

Wednesday, 17 August 2022 16:25 (25 minutes)

We report studies of hadrons performed using two-photon processes at Belle. In particular, the two-photon process $\gamma\gamma \to \gamma\psi(2S)$ is studied for the first time in an effective center-of-mass energy ranging from 3.7 to 4.2 GeV. Evidence is established for a structure in the $\gamma\psi(2S)$ invariant-mass distribution around 3920 MeV/c^2, and hint is found for another structure around 4010 MeV/c^2. With the $\gamma\gamma \to J/\psi\gamma$ process, the two-photon decay width of $\chi_{c2}(1P)$ is reported. We also report the study of $X(3872)$ and $X(3915)$ states using the two-photon process. The results are based on the full data collected with the Belle detector at the KEKB asymmetric-energy e^+e^- collider.

Category

talk

Primary author: ZHU, Wenjing (Fudan University)

Presenter: ZHU, Wenjing (Fudan University)

Session Classification: Session 2

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

Search for New Physics using tau leptons at Belle and Belle II

Thursday, 18 August 2022 21:30 (25 minutes)

We report the searches for New Physics using τ decays based on the data collected with the Belle detector at the KEKB asymmetric-energy e^+e^- collider as well as with its upgrade (Belle II) detector at the SuperKEKB. These searches include tau decays involving heavy neutral leptons or invisible bosons. We also search for a dark leptophilic scalar produced in association with tau pairs at Belle. Further we cover recent searches for lepton-flavor-violating decays of the tau lepton and a measurement of its electric dipole moment.

Category

talk

Primary author: BISWAS, Diptaparna (U)

Presenter: BISWAS, Diptaparna (U)

Session Classification: Session 4

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

(Semi-)leptonic D decays at BESIII

Wednesday, 17 August 2022 14:50 (25 minutes)

BESIII has collected 2.93 and 6.32 fb^{-1} of e^+e^- collision data samples at 3.773 and $4.178 - 4.226$ GeV, respectively. We will report precision measurements of f_{Ds}, $|V_{cs}|$ and test of lepton flavor universality by studying the leptonic decays of $D_s \to l^+\nu$ with $\tau^+ \to \rho^+\nu$, $\pi^+\nu$, and $e^+\nu\nu$. We will also report the studies of $D_s \to \pi^0\pi^0 e^+\nu$ and $K_S K_S e^+\nu$, inclusive D_s semileptonic decay, updates of $D \to Ke\nu$ with a new method.

Category

talk

Primary author: Prof. LIU, Beijiang (高能所)

Presenter: TAO, Qiutian (Hunan University)

Session Classification: Session 1

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

Hadronic D decays at BESIII

Wednesday, 17 August 2022 14:25 (25 minutes)

BESIII has collected 2.93 and $6.32 fb^{-1}$ of e^+e^- collision data samples at 3.773 and $4.178-4.226$ GeV, respectively. We will report the observation of a new a_0 resonance and amplitude analyses of $D_s \to K_S K^+ \pi^0$, $K_S K_S \pi^+$, $\pi^+\pi^0\eta'$, $KK3\pi$, $K\pi\pi\pi^0$, and $\pi^+\pi^0\pi^0$. We will also report the transverse polarization determination in $D^0 \to \omega\phi$, the K_S/K_L asymmetry studies in $D^0 \to K_L X$ ($X = \eta, \eta', \omega$ and phi), and observation of the new decay mode $D^{*0} \to D^0 e^+e^-$. In addition, the measurements of the branching fractions of some $D^{0(+)}$ CF and DCS decays will be presented.

Category

talk

Primary author: Prof. LIU, Beijiang (高能所)

Presenter: ZENG, Xin (Fudan University & IHEP)

Session Classification: Session 1

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

Lambda_c+ decays at BESIII

Wednesday, 17 August 2022 14:00 (25 minutes)

BESIII has collected $4.5 fb^{-1}$ of e^+e^- collision data between 4.6000 and 4.6999 GeV. This unique data offers ideal opportunity to determine absolute branching fractions of Λ_c^+ decays. We will report the first observation of $\Lambda_c^+ \to n\pi^+$. Meanwhile, we will report prospect on the studies of semileptonic and the other hadronic decays of Λ_c^+ in the near future.

Category

talk

Presenter: XIE, Xinhai (Peking University)

Session Classification: Session 1

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

News of h_c and $\eta_c(2S)$ from BESIII

Wednesday, 17 August 2022 18:15 (10 minutes)

With the worldly largest $\psi(2S)$ samples collected at BEESIII, systematic studies of the decays of $\eta_c(2S)$ are performed. As an example, the observation of the decay $\eta_c(2S) \to 3(\pi^+\pi^-)$ will be reported in this talk. Based on the 450M $\psi(2S)$ samples, the mass and width of h_c are updated as well as the branching fraction of $\psi(2S) \to \pi^0 h_c$. In this talk, search for new hadronic decays of h_c and observation of $h_c \to p\bar{p}\eta$ will be reported too. And the upper limit of $h_c \to \pi^0 J/\psi$ will be provided. This analysis utilizes the electron-positron collision data at the energy regions above 4 GeV.

Category

poster

Primary author: LI, Suxian (Fudan University)

Presenter: LI, Suxian (Fudan University)

Session Classification: Posters

Track Classification: Posters

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

The cross-section measurements of electron-positron annihilation into hidden-charm

Thursday, 18 August 2022 14:00 (25 minutes)

In this talk, recent measurements of the cross-section of $e^+e^- \to \pi^+\pi^- J/\psi$, $e^+e^- \to K^+K^- J/\psi$, and $e^+e^- \to \pi^+\pi^-\psi_2(3823)$ at BESIII will be reported. It will include the new decay modes of the well-known resonance, such as $Y(4230)$, and the new observed structures that strongly coupled to these channels.

Category

talk

Primary author: XIE, Yong (Shandong University)

Presenter: XIE, Yong (Shandong University)

Session Classification: Session 1

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

Studies of XYZ resonances with open-charm

Thursday, 18 August 2022 15:15 (25 minutes)

As an iso-spin partner of the charged $Z_{cs}(3985)$ state, the evidence for a neutral near-threshold structure in the K_s recoil-mass spectra in $e^+e^- \to K_s(D_s^- D^{*+} + D_s^{*-} D^+)$ will be reported. Also, there will be report of searching for $X(3872) \to \pi^0\chi_{c0}$ and $X(3872) \to \pi\pi\chi_{c0}$ at BESIII. For the Y state, the cross-section measurements of the $e^+e^- \to D^{*+}D^{*-}$ and $e^+e^- \to D^{*+}D^-$ processes at center-of-mass energies from 4.085 to 4.600 GeV will be given in this talk.

Category

talk

Primary author: LIU, Tong (Fudan University)

Presenter: LIU, Tong (Fudan University)

Session Classification: Session 1

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

Hyperon physics at BESIII

Wednesday, 17 August 2022 15:15 (25 minutes)

With the large datasets on e^+e^--annihilation at the J/ψ and $\psi(3686)$ resonances collected at the BESIII experiment, multi-dimensional analyses making use of polarization and entanglement can shed new light on the production and decay properties hyperon-antihyperon pairs. In a series of recent studies performed at BESIII, significant transverse polarization of the (anti)hyperons has been observed in J/ψ or $\psi(3686)$ to $\Lambda\bar{\Lambda}$, $\Sigma\bar{\Sigma}$, $\Xi\bar{\Xi}$, and $\Omega^-\bar{\Omega}^+$ and the spin of Ω^- has been determined model independently for the first time. The decay parameters for the most common hadronic weak decay modes were measured, and due to the non-zero polarization, the parameters of hyperon and antihyperon decays could be determined independently of each other for the first time. Comparing the hyperon and antihyperon decay parameters yields precise tests of direct, $\Delta S = 1$ CP-violation that complement studies performed in the kaon sector.

Category

talk

Primary author: XIAO, Yunlong (Fudan University)

Presenter: XIAO, Yunlong (Fudan University)

Session Classification: Session 1

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

Light Meson decays at BESIII

Wednesday, 17 August 2022 18:05 (10 minutes)

The world' s largest sample of J/ψ events accumulated at the BESIII detector offers a unique opportunity to investigate η and η physics via two body J/ψ radiative or hadronic decays. In recent years the BESIII experiment has made significant progresses in η/η decays. A selection of recent highlights in light meson spectroscopy at BESIII are reviewed in this report, including the observation of $\eta \to \pi^+\pi^-\mu^+\mu^-$, observation of the cusp effect in $\eta \to \pi^0\pi^0\eta$, search for CP-violation in $\eta \to \pi^+\pi^-e^+e^-$, as well as the precision measurement of the branching fraction of η decays.

Category

poster

Primary author: JI, Yuyao (Shandong University)

Presenter: JI, Yuyao (Shandong University)

Session Classification: Posters

Track Classification: Posters

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

Light Meson Spectroscopy at BESIII

BESIII has the world’ s largest samples of J/ψ and $\psi(3686)$ events from e^+e^- annihilations, which offer an ideal and clean laboratory to study light meson spectroscopy , in particular for the search for QCD exotics. Recent important achievements in this field, including the observation of a 1^{-+} state, $\eta_1(1855)$ in $J/\psi \to \gamma\eta\eta'$, the observation of the $X(2600)$ in $J/\psi \to \gamma\eta'\pi^+\pi^-$, and the PWA of $J/\psi \to \gamma\eta'\eta'$ will be highlighted.

Category

talk

Primary author: LI, Linjian

Presenter: LI, Linjian

Session Classification: Session 3

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

Recent results of Baryon electromagnetic form factors at BESIII

Monday, 15 August 2022 22:35 (30 minutes)

At BESIII, the electromagnetic form factors (EMFFs) and the pair production cross sections of various baryons have been studied. The proton EMFF ratio |GE/GM| is determined precisely and line-shape of |GE| is obtained for the first time. The recent results of neutron EMFFs at BESIII show great improvement comparing with previous experiments. Cross sections of various baryon pairs (Λ, Σ, Ξ, Λ_c) are studied from their thresholds. Anomalous enhancement behavior on the Lambda and Lambdac pair are observed.

Category

talk

Primary author: IRSHAD, Muzaffar (University of Science and Technology of China)

Presenter: IRSHAD, Muzaffar (University of Science and Technology of China)

Session Classification: Session 4

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

R value measurements at BESIII

Monday, 15 August 2022 16:05 (30 minutes)

At BESIII, the R value is measured with a total of 14 data points with the corresponding c.m. energy going from 2.2324 to 3.6710 GeV. The statistical uncertainty of the measured R is less than 0.6%. Two different simulation models, the LUARLW and a new Hybrid generated, are used and give consistent detection efficiencies and initial-state-radiation corrections. An accuracy of better than 2.6% below 3.1 GeV and 3.0% above is achieved in the R values.

Category

talk

Primary author: HU, Haiming (IHEP , CAS)

Presenter: HU, Haiming (IHEP , CAS)

Session Classification: Session 2

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

Light flavor vector mesons between 2 and 3 GeV at BESIII

Wednesday, 17 August 2022 18:25 (10 minutes)

At BESIII, the lineshapes of $e^+e^- \to \phi\eta'$, $\phi\eta$, KK, $\omega\pi^0$, $\eta\pi\pi$, $\omega\pi\pi$ are measured from 2.0 to 3.08 GeV, where resonant structures are observed in these processes. Multiple lineshapes of intermediate state are obtained by a partial wave analysis of $e^+e^- \to K^+K^-\pi^0\pi^0$, $K^+K^-\pi^0$ and the structures observed provide essential input to understand the nature of $\phi(2170)$. These results provide important information for light flavor vector mesons i.e. excited ρ, ω and ϕ, for energy regions above 2 GeV.

Category

poster

Primary author: HUANG, Linqin (Institute of Modern Physics)

Presenter: HUANG, Linqin (Institute of Modern Physics)

Session Classification: Posters

Track Classification: Posters

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

Status and perspective of the $\gamma\gamma$ physics program at BESIII

Wednesday, 17 August 2022 16:00 (25 minutes)

The improvement of the standard model (SM) prediction of the muon anomalous magnetic moment $(g-2)$ is of utmost importance in view of the recent and upcoming experimental results from the FNAL E989 experiment. The BESIII collaboration is strongly involved in providing valuable inputs towards a strong reduction of the dominant sources of uncertainty to the SM calculation: the hadronic vacuum polarization and the hadronic light-by-light scattering. This talk will provide an overview on the current status and perspective of the gamma-gamma physics program at BESIII.

Category

talk

Primary author: REDMER, Christoph Florian (Johannes Gutenberg University of Mainz)

Presenter: REDMER, Christoph Florian (Johannes Gutenberg University of Mainz)

Session Classification: Session 2

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

Dark sector search at BESIII

Wednesday, 17 August 2022 22:20 (25 minutes)

The BESIII experiment is a symmetric e^+e^- collider operating at c.m. energy from 2 to 4.95 GeV. With the world' s largest data set of J/ψ (10 Billion), $\psi(2S)$ (2.6 Billion), and about $25fb^{-1}$ scan data from 3.77 to 4.95 GeV, we are able search various dark sectors produced in e^+e^- annihilation and meson decay processes. In this talk, we report the recent search for dark photon candidate in $J/\psi \to e^+e^-\eta/\eta'$, $e^+e^- \to \gamma A' \to \mu^+\mu^-/e^+e^-$, $e^+e^- \to \gamma + invisible$ process. In addition, a possible light Higgs A_0 in $J/\psi \to \gamma A_0$ process is also searched.

Category

talk

Primary author: LIU, Zhiqing (Shandong University)

Presenter: LIU, Zhiqing (Shandong University)

Session Classification: Session 4

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

Search for rare decays at BESIII

Thursday, 18 August 2022 19:30 (25 minutes)

The BESIII experiment has collected 2.6B $\psi(2S)$ events and 10B J/ψ events. The huge data sample provide an excellent chance to search for rare processes in charmonium decays. In this talk, we report the recent search for $J/\psi \to \phi e^+ e^-$, $D^- e^+ \nu_e$. The big charmonium sample also produce millions of hyperons, which is used to study the weak decay of $\Sigma^- \to p e^- e^- / \Sigma^+ X$, $\Xi^- \to \Xi^0 e^- \nu_e$. The LNV/BNV processes $J/\psi \to \Lambda_c e^-$, $D \to K \pi e e$, $D- > \Lambda/\Sigma e$, $J/\psi \to e\tau/e\mu$, $D^0 \to pe$ are also searched. In addition, we also search for the FCNC process $D^0 \to \pi^0 \nu \bar{\nu}$ at BESIII.

Category

talk

Primary author: YOU, Zhengyun (Sun Yat-Sen (Zhongshan) University)

Presenter: YOU, Zhengyun (Sun Yat-Sen (Zhongshan) University)

Session Classification: Session 3

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

On masses of narrow ϒ states

Friday, 19 August 2022 19:30 (25 minutes)

In view of a new experiment which is under preparation at VEPP-4M collider at Novosibirsk the results the mass measurements conducted about forty years ago were reanalyzed. The reanalysis includes, when required, radiative corrections, interference effects, use of modern electron's mass value and more accurate numerical calculations. The shift of $\Upsilon(2S)$ mass for some measurements reach 0.4 MeV. The disagreement of $\Upsilon(1S)$ mass measurements at CESR and VEPP-4 has reduced from 3.2 to 1.8 standard deviations (0.29 MeV). The forthcoming experiment is briefly discussed. The expected accuracy of $\Upsilon(1S)$ mass measurement is
about 50 keV.

Category

talk

Primary author: SHAMOV, Andrey (Budkedr Instute of Nuclear Physics)

Presenter: SHAMOV, Andrey (Budkedr Instute of Nuclear Physics)

Session Classification: Session 3

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

Measurement of J/ψ decays into final states $2(\pi^+\pi^-)\pi^0$, $K^+K^-\pi^+\pi^-\pi^0$, $2(\pi^+\pi^-)$ and $K^+K^-\pi^+\pi^-$ with the KEDR detector

Thursday, 18 August 2022 16:25 (25 minutes)

Using the 1.32 pb^{-1} statistics collected at the J/ψ peak with the KEDR detector at the VEPP-4M e^+e^- collider, we measured the branching fractions of J/ψ meson decays to the final states $2(\pi^+\pi^-)\pi^0$, $K^+K^-\pi^+\pi^-\pi^0$, $2(\pi^+\pi^-)$ and $K^+K^-\pi^+\pi^-$. The results obtained for the decays $J/\psi \to 2(\pi^+\pi^-)\pi^0$, $J/\psi \to K^+K^-\pi^+\pi^-\pi^0$ contradict the measurements performed by other groups in the last century, but agree well with recent results of BABAR and BESIII collaborations.

Category

talk

Primary author: MALYSHEV, Vladimir (Budker Institute of Nuclear Physics)

Presenter: MALYSHEV, Vladimir (Budker Institute of Nuclear Physics)

Session Classification: Session 2

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

LFV within little Higgs models realizing a low-scale see-saw

Friday, 19 August 2022 20:20 (25 minutes)

Little Higgs models were proposed as an attractive way of reducing the little hierarchy problem. Their promising LFV phenomenology has been studied (mainly for the Littlest Higgs model with T-parity, LHT, and for the Simplest Little Higgs model, SLH) in the last decade by several groups worldwide. We have recently highlighted the changes with respect to this well-known pattern induced by the addition to these models of a low-scale see-saw mechanism, characterized by a few Majorana neutrinos with O(10) TeV masses. In this case, not only the predicted branching ratios increase, and are now within an order of magnitude of the current upper limits (in $\mu \to e$ as well as in $\tau \leftrightarrow e/\mu$ transitions); but also the correlations among processes change noticeably, which would allow the eventual identification of such a scenario in the current and forthcoming experiments.

Category

talk

Primary author: PACHECO, Iván (Cinvestav, Mexico)

Presenter: PACHECO, Iván (Cinvestav, Mexico)

Session Classification: Session 3

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

Muonium spectroscopy at J-PARC

Friday, 19 August 2022 14:00 (25 minutes)

In this contribution, I will present the muonium spectroscopy at J-PARC, and also facility status.

Category

talk

Primary author: SHIMOMURA, Koichiro (KEK)

Presenter: SHIMOMURA, Koichiro (KEK)

Session Classification: Session 1

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

Semileptonic b Decays at Future Z Factories

Friday, 19 August 2022 21:55 (25 minutes)

As one of the hypothetical principles in the Standard Model (SM), lepton flavor universality (LFU) should be measured with a precision as high as possible such that the physics violating this principle can be fully tested. The Z factories at the future e^-e^+ colliders provide a great opportunity to perform this task because of their large statistics and high reconstruction efficiencies for B mesons at Z pole. These advantages are further strengthened if τ leptons are produced via the B-meson decays as a third-generation flavor. In this paper, we present a systematic study on the LFU test in different operation scenarios of the future Z factories. The goal is two-fold. Firstly, we study the sensitivities of measuring the LFU-violating observables which have involved the $b \to c\tau\nu$ transitions, namely $R_{J/\psi}$, R_{D_s}, $R_{D_s^*}$ and R_{Λ_c}, using the mode of muonic τ decays. For this purpose, the strategies of event reconstruction are developed on the basis of the charged-track information. Secondly, we interpret the projected sensitivities in the SM effective field theory (with an assumption that the LFU-violating physics occurs to the third generation exclusively), by combining the LFU tests with $b \to c\tau\nu$ and the measurements of the $b \to s\tau^-\tau^+$ and $b \to s\nu\nu$ transitions. We show that the limits on the LFU-violating energy scale can be pushed up to ~ 10 TeV for $\sim \mathcal{O}(1)$ Wilson coefficients.

Category

talk

Primary author: JIANG, Xuhui (Hong Kong University of Science and Technology)

Presenter: JIANG, Xuhui (Hong Kong University of Science and Technology)

Session Classification: Session 4

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

The Strong2020 and Radio MonteCarLow activities

Friday, 19 August 2022 21:30 (25 minutes)

During the last 15 years the "Radio MontecarLow ("Radiative Corrections and Monte Carlo Generators for Low Energies") Working Group, see www.lnf.infn.it/wg/sighad/, has been providing valuable support to the development of radiative corrections and Monte Carlo generators for low energy e+e- data and tau-lepton decays. Its operation which started in 2006 proceeded until the last few years bringing together at 20 meetings both theorists and experimentalists, experts working in the field of e+e- physics and partly also the tau community and produced the report
"Quest for precision in hadronic cross sections at low energy: Monte Carlo tools vs. experimental data" S. Actis et al. Eur. Phys. J. C 66, 585-686 (2010) (https://arxiv.org/abs/0912.0749), which has more than 300 citations.
While the working group has been operating for more than 15 years without a formal basis for funding, parts of our program have recently been included as a Joint Research Initiative in the group application of the European hadron physics community, STRONG2020, to the European Union, with a more specific goal of creating an annotated database for low-energy hadronic cross sections in e+e- collisions. The database will contain information about the reliability of the data sets, their systematic errors, and the treatment of RC.
All these efforts have been recently revitalized by the new high-precision measurement of the anomalous magnetic moment of the muon at Fermilab, which, when combined with the final result from the Brookhaven experiment, shows a 4.2σ discrepancy with respect to the state-of-the-art theoretical prediction from the Standard Model, including an evaluation of the leading-order hadronic-vacuum-polarization contribution from e+e− ⟶ hadrons cross-section data.
We will report on these Radio MonteCarLow and Strong2020 activities.

Category

talk

Primary author: VENANZONI, Graziano (I)

Presenter: VENANZONI, Graziano (I)

Session Classification: Session 4

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

Four-Quark Nature of Light Scalar Mesons

Thursday, 18 August 2022 13:35 (25 minutes)

It is shown that all predictions for the light scalars, based on their four-quark nature, are supported by experiment. The future research program is outlined also.

Category

talk

Primary author: ACHASOV, Nikolay (Sobolev Institute of Mathematics, 2009 Siberian Branch of the Russian Academy of Sciences)

Presenter: ACHASOV, Nikolay (Sobolev Institute of Mathematics, 2009 Siberian Branch of the Russian Academy of Sciences)

Session Classification: Session 1

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

Charm hadron lifetime measurements at Belle II

Friday, 19 August 2022 19:55 (25 minutes)

Outstanding vertexing performance and low-background environment are key enablers of a systematic Belle II program targeted at measurements of charm hadron lifetimes Recent results from measurements of D^0 meson, D^+ meson and Λ_c baryon lifetimes are presented. The results are the most precise to date.

Category

talk

Primary author: DI CANTO, Angelo (BNL)

Presenter: DI CANTO, Angelo (BNL)

Session Classification: Session 3

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

Recent dark sector results at Belle II

Wednesday, 17 August 2022 21:55 (25 minutes)

Belle has unique reach for a broad class of models that postulate the existence of dark matter particles with MeV—GeV masses. This talk presents recent world-leading physics results from Belle II searches for dark Higgstrahlung. ALPs and Z'.

Category

talk

Primary author: ITO, Shintaro (KEK)

Presenter: ITO, Shintaro (KEK)

Session Classification: Session 4

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

Bottomonium results from Belle II

Tuesday, 16 August 2022 18:25 (25 minutes)

Belle II offers unique possibilities for the discovery and interpretation of exotic multiquark combinations to probe the fundamentals of QCD. This talk present recent results from a scan above the $\Upsilon(4S)$ resonance.

Category

talk

Primary author: JIA, Sen (Fudan University)

Presenter: JIA, Sen (Fudan University)

Session Classification: Session 2

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

Recent results from Belle II

Monday, 15 August 2022 22:05 (30 minutes)

The Belle II experiment at the SuperKEKB energy-asymmetric e^+e^- collider is a substantial upgrade of the B factory facility at the Japanese KEK laboratory. The design luminosity of the machine is $6 \times 10^{35} cm^{-2} s^{-1}$ and the Belle II experiment aims to ultimately record $50 ab^{-1}$ of data, a factor of 50 more than its predecessor. With this data set, Belle II will be able to measure the Cabibbo-Kobayashi-Maskawa (CKM) matrix, the matrix elements and their phases, with unprecedented precision and explore flavor physics with B and charmed mesons, and τ leptons. Belle II has also a unique capability to search for low mass dark matter and low mass mediators. In this presentation, we will review the latest results from Belle II, with emphasis on those related to lepton flavour violation.

Category

talk

Primary author: GAZ, Alessandro (U)

Presenter: GAZ, Alessandro (U)

Session Classification: Session 4

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

Next-to-Next-to-Leading-Order QCD Prediction for the Photon-Pion Form Factor

Wednesday, 17 August 2022 17:15 (25 minutes)

We accomplish the complete two-loop computation of the leading-twist contribution to the photon-pion transition form factor $\gamma\gamma^* \to \pi$ by applying the hard-collinear factorization theorem together with modern multi-loop techniques. The resulting predictions for the form factor indicate that the two-loop perturbative correction is numerically important. We also demonstrate that our results will play a key role in disentangling various models of the twist-two pion distribution amplitude thanks to the envisaged precision at Belle II.

Category

talk

Primary author: WANG, Yu-Ming (Nankai University)

Presenter: WANG, Yu-Ming (Nankai University)

Session Classification: Session 2

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

Exotic hadron naming convention

Monday, 15 August 2022 21:20 (45 minutes)

Many new exotic hadrons, that do not fit into the existing naming scheme for hadrons, have been discovered over the past few years. A new scheme is set out, extending the existing protocol, in order to provide a consistent naming convention for these newly discovered states, and other new hadrons that may be discovered in future.

Category

talk

Primary author: GERSHON, Tim (U)

Presenter: GERSHON, Tim (U)

Session Classification: Session 4

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

1^{-+} Hybrid in J/ψ Radiative Decays from Lattice QCD

Tuesday, 16 August 2022 15:55 (25 minutes)

We present the first theoretical prediction of the production rate of 1^{-+} light hybrid meson η_1 in J/ψ radiative decays. In the $N_f = 2$ lattice QCD formalism with the pion mass $m_\pi \approx 350$ MeV, the related electromagnetic multipole form factors are extracted from the three-point functions that involve necessarily quark annihilation diagrams, which are calculated through the distillation method. The partial width of $J/\psi \to \gamma\eta_1$ is determined to be $2.29(77)$ eV at the η_1 mass $m_{\eta_1} = 2.23(4)$ GeV. If η_1 corresponds to the recently observed $\eta_1(1855)$ in the process $J/\psi \to \gamma\eta_1(1855) \to \gamma\eta\eta'$ by BESIII, then the branching fraction $\mathrm{Br}(J/\psi \to \gamma\eta_1(1855))$ is estimated to be $6.2(2.2) \times 10^{-5}$, which implies $\mathrm{Br}(\eta_1(1855) \to \eta\eta') \sim 4.3\%$.

Category

talk

Primary author: CHEN, Feiyu (Institute of High Energy Physics)

Co-authors: Mr SHI, Chunjiang (Institute of High Energy Physics); Dr GONG, Ming (Institute of High Energy Physics); Dr SUN, Wei (Institute of High Energy Physics); Dr CHEN, Ying (Institute of High Energy Physics); LIU ZHAOFENG, Zhaofeng (Institute of High Energy Physics, CAS); Mr JIANG, xiangyu (Institute of High Energy Physics)

Presenter: CHEN, Feiyu (Institute of High Energy Physics)

Session Classification: Session 2

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

Study of a fine structure in the hadronic e+e- cross sections at $N\bar{N}$ threshold at VEPP2000

Thursday, 18 August 2022 14:50 (25 minutes)

A special scan for data collection at the $p\bar{p}$ and $n\bar{n}$ thresholds has been performed at the VEPP2000 e^+e^- collider. About 10 pb^{-1} per point were collected by the SND and CMD-3 detectors with about 1 MeV step, comparable with the energy spread of the c.m. energy. Energy stability at the level 0.1 MeV was continuously monitored by the back-scattering laser system. We present few preliminary results of the hadron cross sections at and around the $N\bar{N}$ threshold obtained with the CMD-3 detector.

Category

talk

Primary author: SOLODOV, Evgeny (BudkerINP)

Co-author: CMD-3 COLLABORATION, - (-)

Presenter: SOLODOV, Evgeny (BudkerINP)

Session Classification: Session 1

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

Hadron physics results at KLOE-2

Thursday, 18 August 2022 16:50 (25 minutes)

KLOE and KLOE-2 data (almost 8 fb^{-1}) constitute a unique sample, rich in physics, and the largest dataset ever collected at an electron-positron collider operating at the ϕ peak resonance.
In total it corresponds to the production of about 24 billion ϕ mesons, whose decays include about 8 billion pairs of neutral K mesons and about 300 million η mesons.
A wide hadron physic program, investigating rare meson decays, $\gamma\gamma$ interaction, and dark forces, is thus carried out by the KLOE-2 Collaboration.

The $\eta \to \pi^0\gamma\gamma$ decay is a test bench for various models and effective theories like VMD (Vector Meson Dominance) or ChPT (Chiral Perturbation Theory) which predict BR far from the experimental value. KLOE-2, with its highly pure η sample produced
in $\phi \to \eta\gamma$ process, can give a more refined measurement of this branching ratio.

KLOE-2 continues also its tradition on dark searches testing an opposite model to the U boson or "dark photon", where the dark force mediator is a hypothetical leptophobic B boson that could show up in the $\phi \to \eta_B \to \eta\pi^0\gamma$, $\eta \to \gamma\gamma$ channel. The upper limit on the α_B coupling constant will be shown.

A KLOE-2 distinctive feature is also the the possibility to investigate π^0 production from $\gamma\gamma$ scattering by tagging final-state leptons from $e^+e^- \to \gamma^{(*)}\gamma^{(*)}e^+e^- \to \pi^0e^+e^-$ in coincidence with the π^0 in the barrel calorimeter. The preliminary measurement of the $\gamma^*\gamma \to \pi^0$ cross section performed with single-tagged events will be reported.

Moreover, the search for the double suppressed $\phi \to \eta\pi^+\pi^-$ and the conversion $\phi \to \eta\mu^+\mu^-$ decays are being performed at KLOE-2 with both $\eta \to \gamma\gamma$ and $\eta \to 3\pi^0$. Clear signals are seen for the first time.

Finally, preliminary and promising results on the ω cross-section measurement in the $e^+e^- \to \pi^+\pi^-\pi^0\gamma_{\rm ISR}$ channel using the Initial State Radiation (ISR) method will be also presented.

Category

talk

Primary author: DI DOMENICO, Antonio (S)

Presenter: KANG, Xiaolin (INFN-LNF)

Session Classification: Session 2

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

Recent KLOE-2 results on entangled neutral kaons

Monday, 15 August 2022 17:05 (30 minutes)

The entanglement of $K^0\bar{K^0}$ pairs produced in ϕ-meson decays, in combination with the unique properties of the neutral kaon system –such as flavour oscillations, charge-parity (CP) and time-reversal (T) violation –allows testing the basic principles of quantum mechanics and its fundamental discrete symmetries T , CP, CPT.

The KLOE and KLOE-2 experiments at the Frascati Laboratories of INFN collected at the DAΦNE collider an integrated luminosity of about 8 fb^{-1}, corresponding to $\simeq 8 \times 10^9$ $K_S K_L$ entangled pairs produced. This is the world largest available data sample of this kind and represents a unique tool to improve the precision on these studies.

The most recent KLOE-2 results will be presented:

(i) an improved search for decoherence and CPT violation effects that exploits EPR correlations in the process $\phi \to K_S K_L \to \pi^+\pi^-\pi^+\pi^-$, and constraints the parameters of various phenomenological models with a precision that reaches - for some of them - the interesting level at which –in the most optimistic scenarios –quantum gravity effects might show up.

(ii) the first direct test of the T and CPT symmetries in neutral kaon transitions between flavor and CP eigenstates, by studying the processes $\phi \to K_S K_L \to \pi^+\pi^-\, \pi e\nu$, $\phi \to K_S K_L \to \pi e\nu\, 3\pi^{0\sim}$;

(iii) a new measurement of the $K_S \to \pi e\nu$ branching fraction, that in combination with the previous KLOE result improves the total precision by almost a factor of two, and allows a new derivation of $f_+(0)|V_{us}|$.

Category

talk

Primary author: DI DOMENICO, Antonio (S)

Presenter: GAJOS, Aleksander (J)

Session Classification: Session 2

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

Precision Physics at MAMI and MESA

Friday, 19 August 2022 22:20 (25 minutes)

The Mainz Microtron MAMI provides an intense electron beam with energies up to 1.6 GeV. Precision measurements of the electromagnetic form factors and the polarizability of the nucleon are performed. The high degree of polarization of the beam also allows for precision measurements of parity violating asymmetries in elastic electron-proton scattering with longitudinally polarized electrons and determinations of the the two-photon exchange amplitude in the elastic scattering of electrons off nuclei with transversersely polarized electrons.

Currently, the new accelerator facility MESA is under construction. It will provide an even more intense electron beam that opens the window for high precision experiments. The MAGIX collaboration will use the very intense beam at the energy recovering mode with an internal gas target for very precise cross section measurements. The P2 collaboration plans experiments with parity violating electron scattering for a determination of the weak mixing angle which is sensitive to physics beyond the Standard Model in an energy range of up to 49 TeV. Futhermore, the DarkMESA experiment will perform a search for light dark matter at the MESA beam dump.

Category

talk

Primary author: BAUNACK, Sebastian (I)

Presenter: BAUNACK, Sebastian (I)

Session Classification: Session 4

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

Searching for heavy neutral leptons using τ decays at BABAR

Thursday, 18 August 2022 21:55 (25 minutes)

This talk presents a model independent search for an additional heavy, mostly sterile, neutral lepton (HNL) which is capable of mixing with the Standard Model tau neutrino with a mixing strength of $|\tau 4|2$, corresponding to the square of the extended Pontecorvo–Maki–Nakagawa–Sakata (PMNS) matrix element. HNLs are hypothetical particles predicted by many beyond Standard Model theories, which can explain oscillation anomalies as well as the baryon asymmetry in the universe through leptogenesis. HNLs can also provide dark matter candidates. We search for HNL production in the decays of the tau lepton analyzing a data set from the $BABAR$ experiment, with a total integrated luminosity of $424\ fb^{-1}$. A kinematic approach is taken and no assumptions are made regarding the model behind the origins of the HNL, its lifetime or decay modes.

Category

talk

Primary author: PATRIGNANI, Claudia (Universita' and INFN Bologna)

Presenter: PATRIGNANI, Claudia (Universita' and INFN Bologna)

Session Classification: Session 4

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

Search for an Axion-Like Particle in B meson decays at BABAR

Wednesday, 17 August 2022 22:45 (25 minutes)

Axion-like particles (ALPs) are predicted in many extensions of the Standard Model, and their masses can naturally be well below the electroweak scale. In the presence of couplings to electroweak bosons, these particles could be emitted in flavor-changing B meson decays. We present a search for an axion-like particle (ALP), a, produced in the Flavor-Changing Neutral-Current decay $B \to Ka$, with $\to \gamma\gamma$. This search, performed using a dataset of about 470 million $B\bar{B}$ pairs collected by the $BABAR$ experiment at the PEP-II e^+e^- collider, is sensitive to ALP masses below 4.78 GeV.

Category

talk

Primary author: Prof. SHUVE, Brian (Harvey Mudd College/ BaBar Collaboration)

Co-author: NGUYEN, Ngan (J)

Presenter: NGUYEN, Ngan (J)

Session Classification: Session 4

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

Exploring the Strange-Meson Spectrum with COMPASS

Thursday, 18 August 2022 17:15 (25 minutes)

The excitation spectrum of light mesons; which are composed of up, down, and strange quarks; allows us to study QCD at low energies. While the non-strange light-meson spectrum is already mapped out rather well, many predicted strange mesons have not yet been observed experimentally and many potentially observed states still need further confirmation. Hence, the strange-meson spectrum still holds many surprises that need to be discovered.
The COMPASS experiment at CERN has studied so far mainly non-strange mesons of the a_J and π_J families with high precision, using the dominating π^- component of the beam. Using the smaller K^- component allows us to investigate also the spectrum of strange mesons. The flagship channel is the $K^-\pi^-\pi^+$ final state, for which COMPASS has acquired the so-far world's largest data set. Based on this data set, we performed a partial-wave analysis in order to disentangle the produced mesons by their spin-parity quantum numbers.
In this talk, we will focus on recent results from this analysis of COMPASS data.

Category

talk

Primary author: WALLNER, Stefan (Technical University of Munich)

Presenter: WALLNER, Stefan (Technical University of Munich)

Session Classification: Session 2

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

Study of the $\omega \to \pi^0 e^+ e^-$ conversion decay with the CMD-3 detector at VEPP-2000 collider

Thursday, 18 August 2022 16:00 (25 minutes)

Measurements of the branching ratios of conversion decays are necessary to test the vector dominance model and estimate the background in the study of quark-gluon plasma. An important source of information about the physical processes occurring in a quark-gluon plasma is the production of dileptons, in particular, the production of electron-positron pairs. In experiments, the measured number of lepton pairs exceeds the theoretically predicted one.
One of the main contributions to background events in the analysis of dilepton spectrum is the conversion decays of vector mesons. In particular, ω meson decay into $\pi^0 e^+ e^-$ should be taken into account.

The study of the conversion decay $\omega \to \pi^0 e^+ e^-$ in the decay channel $\pi^0 \to \gamma\gamma$ was performed with the CMD-3 detector at the VEPP-2000 $e^+ e^-$ collider at the BINP in Novosibirsk. The analysis uses the data collected at the center of mass energy range 660 MeV - 840 MeV with total integrated luminosity of about 10 1/pb.

The main background processes are $\pi^0\pi^+\pi^-$ events, QED events, and $\pi^0\gamma$ decay events, when a monochromatic photon is converted into e^+e^- pair on the material before the sensitive volume of the detector. To suppress the latter type of background, a deep neural network was used. The efficiencies of photons reconstruction, trigger, reconstruction of close tracks, and neural network application were calculated. The Born cross-section of the process under study was measured in the range 660 MeV – 840 MeV and a preliminary result was obtained for the branching ratio of $\omega \to \pi^0 e^+ e^-$. The result is twice more precise than any previous measurements.

Category

Primary authors: KUTSENKO, Bogdan (Budker Institute of Nuclear Physics); KAZANIN, Vasily (Budker Institute of Nuclear Physics)

Presenter: KUTSENKO, Bogdan (Budker Institute of Nuclear Physics)

Session Classification: Session 2

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

Recent results from the SND experiment at the VEPP-2000 collider

Friday, 19 August 2022 15:15 (25 minutes)

The Spherical Neutral Detector (SND) collects data at the VEPP-2000 e^+e^- collider in Novosibirsk. In this talk we present the latest SND results on study of exclusive processes of e^+e^- annihilation into hadrons at c.m. energies below 2 GeV. In particular, we discuss the measurement of the $e^+e^- \to \pi^+\pi^-$ cross section in the energy range $0.53 - 0.88$ GeV, the measurement of the $e^+e^- \to n\bar{n}$ cross section near the production threshold, and the study of the radiative decays of excited light vector mesons to $\eta\pi^0\gamma$ and $\eta\eta\gamma$.

Category

talk

Primary author: KOVRIZHIN, Dmitriy (Budker Institute of Nuclear Physics)

Presenter: KOVRIZHIN, Dmitriy (Budker Institute of Nuclear Physics)

Session Classification: Session 1

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

Two-photon transitions of charmonia on the light front

Wednesday, 17 August 2022 16:50 (25 minutes)

We present a parameter-free prediction of the two-photon transitions of the charmonium system $[c\bar{c}] \to \gamma^*\gamma$ in a relativistic light-front formalism. The use of light-front formulation automatically takes into account the large-Q^2 behavior of the process as predicted by pQCD. Furthermore, the relativistic nature of the light-front dynamics provides a reliable access to the decay widths at $Q^2 \to 0$, a short-distance quantity. The light-front wave functions were obtained from solving the effective Hamiltonian based on light-front holography and one-gluon exchange interaction within the basis light-front quantization approach. The same wave functions have been used to compute a wide range of observables, e.g. form factors, decay width, radiative widths, generalized parton distribution functions and cross sections of the diffractive vector meson productions, with reasonable agreements with the experimental measurements whenever available. In this talk, we will present the numerical results of the two-photon transition form factors as well as the two-photon decay widths for S- and P-wave charmonia, η_c and χ_{cJ} and their excitations. Without introducing any free parameters, our results are in good agreement with the recent experimental measurements by BABAR, BES and BELLE, shedding light on the relativistic nature of charmonium.

Reference:
Y. Li, M. Li, J.P. Vary, Phys. Rev. D. **105**, L071901 (2022)

Category

talk

Primary author: LI, Yang (University of Science and Technology of China)

Co-authors: VARY, James (Iowa State University); LI, Meijian (Universidade de Santiago de Compostela)

Presenter: LI, Yang (University of Science and Technology of China)

Session Classification: Session 2

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

Two-photon contributions to the muonic hydrogen Lamb shift from lattice QCD

Wednesday, 17 August 2022 17:40 (25 minutes)

A recent lattice QCD calculation of two-photon contributions to the muonic hydrogen Lamb shift will be reported.

Category

Primary author: FENG, Xu (Peking University)

Presenter: FENG, Xu (Peking University)

Session Classification: Session 2

Contribution ID: **65** Type: **not specified**

Status of the MUonE experiment

Tuesday, 16 August 2022 17:35 (25 minutes)

The latest measurement of the muon g-2 announced at Fermilab exhibits a 4.2σ discrepancy from the currently accepted Standard Model prediction. The main source of uncertainty on the theoretical value is represented by the leading order hadronic contribution a_μ^{HLO}, which is traditionally determined through a data-driven dispersive approach. A recent calculation of a_μ^{HLO} based on lattice QCD is in tension with the dispersive evaluation, and weakens the discrepancy between theory and experiment to 1.5σ. An independent crosscheck of a_μ^{HLO} is thus required to solve this tension and consolidate the theoretical prediction. The MUonE experiment proposes a novel approach to determine a_μ^{HLO} by measuring the running of the electromagnetic coupling constant in the space-like region, via $\mu - e$ elastic scattering. The measurement will be performed by scattering a 160 GeV muon beam, currently available at CERN's North Area, on the atomic electrons of a low-Z target. A Test Run on a reduced detector is planned to validate this proposal. The status of the experiment in view of the Test Run will be presented.

Category

talk

Primary author: PILATO, Riccardo Nunzio (University and INFN Pisa)

Presenter: PILATO, Riccardo Nunzio (University and INFN Pisa)

Session Classification: Session 2

Contribution ID: **66** Type: **not specified**

Status of charmed baryon physics

Monday, 15 August 2022 14:10 (30 minutes)

I'll review the recent progresses and highlights in the following topics of charmed baryon physics: (i) spin-parity quantum numbers of excited charmed baryon resonances, (ii) lifetimes of singly and doubly charmed baryons, (iii) nonleptonic weak decays of charmed baryons, (iv) charm-flavor-conserving hadronic decays, and (v) semi-leptonic decays.

Category

talk

Primary author: CHENG, Hai-Yang (Academia Sinica)

Presenter: CHENG, Hai-Yang (Academia Sinica)

Session Classification: Session 1

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

Experimental Program for Super Tau-Charm Facility

Monday, 15 August 2022 20:00 (30 minutes)

The proposed STCF is a symmetric electron-positron beam collider designed to provide e^+e^- interactions at a centerof-mass energy from 2.0 to 7.0 GeV. The peaking luminosity is expected to be $0.5 \times 10^{35} cm^{-2} s^{-1}$. The energy region of STCF covers the pair production thresholds for τ-leptons, charmed meson & baryons, and all of the strange hyperons. STCF is expected to deliver more than 1 ab^{-1} of integrated luminosity per year. Huge samples of XYZ, J/ψ , $D^{+(0)}$, D_s^+ and Λ_c decays could be used to make precision measurements of the properties of XYZ particles, search for new ones, and study their rare decays; map out the spectroscopies of QCD hybrids and glueballs; search for new sources of CP violation in the strange-hyperon and τ–lepton sectors with unprecedented sensitivity; make precise independent measurements of the Cabibbo angle (θ_c) to test the unitarity of the CKM flavor-mixing matrix and address the Cabibbo Angle Anomaly; search for anomalous decays with sensitivities extending down to the level of SM-model expectations; qualify Lattice QCD calculations; and provide precise inputs that are essential for the interpretation of results from other experiments.

Category

talk

Primary author: ZHOU, Xiaorong (University of Science and Technology of China)

Presenter: ZHOU, Xiaorong (University of Science and Technology of China)

Session Classification: Session 3

Contribution ID: **68** Type: **not specified**

Muon g-2/EDM experiment at J-PARC

Tuesday, 16 August 2022 17:10 (25 minutes)

The Muon g-2/EDM experiment at J-PARC (E34) aims to measure muon g-2 and EDM with different approach from FNAL and BNL Muon g-2 experiments. The technical design of the experiment has been completed, and construction of the experiment has started. The budget is being requested to start the data taking in 2027. In the first phase, the measurement of g-2 with a precision of 0.45 ppm is expected in two years of data acquisition. Novel techniques and progress of the experiment are presented.

Category

talk

Primary author: ZHANG, Ce (Peking University)

Presenter: ZHANG, Ce (Peking University)

Session Classification: Session 2

Contribution ID: **69** Type: **not specified**

Recent results from the CMD-3

Thursday, 18 August 2022 14:25 (25 minutes)

The CMD-3 experiment at the VEPP-2000 collider is aimed to measure the cross-sections and dynamics of the exclusive modes of $e^+e^- \to hadrons$ reactions in the system energy range from 0.32 GeV to 2 GeV.
The experiment has collected 600 pb^{-1}. In this report we will discuss current status and results obtained by the collaboration of the CMD-3 experiment.

Category

talk

Primary author: RAZUVAEV, Georgiy (Budker Institute of Nuclear Physics)

Co-authors: SHWARTZ, Boris (B); EPIFANOV, Denis (Budker Institute of Nuclear Physics); SOLODOV, Evgeny (BudkerINP); Dr IGNATOV, Fedor (Budker Institute of Nuclear Physics); FEDOTOVICH, G. (INP); Dr LOGASHENKO, Ivan (Budker Institute of Nuclear Physics); Mr EPSHTEYN, Leonid (Budker Institute of Nuclear Physics)

Presenter: RAZUVAEV, Georgiy (Budker Institute of Nuclear Physics)

Session Classification: Session 1

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

Interpretation of the $\eta_1(1855)$ as a $K\bar{K}_1(1400) + c.c.$ molecule

Tuesday, 16 August 2022 14:45 (25 minutes)

An exotic state with $J^{PC} = 1^{-+}$, denoted by $\eta_1(1855)$, was observed by BESIII collaboration recently in $J/\psi \to \gamma\eta\eta'$. The fact that its mass is just below the threshold of $K\bar{K}_1(1400)$ stimulates us to investigate whether this exotic state can be interpreted as a $K\bar{K}_1(1400) + c.c.$ {molecule or not}. Using the one boson exchange model, we show that it is possible for $K\bar{K}_1(1400)$ with $J^{PC} = 1^{-+}$ to bind together by taking the momentum cutoff $\Lambda \sim 2$ GeV and yield the same binding energy as the experimental value when $\Lambda \approx 2.5$ GeV. In this molecular picture, the predicted branch ratio $\mathrm{Br}(\eta_1(1855) \to \eta\eta') \approx 15\%$ is consistent with the experimental results, which again supports the molecular explanation of $\eta_1(1855)$. Relevant systems, namely $K\bar{K}_1(1400)$ with $J^{PC} = 1^{--}$ and $K\bar{K}_1(1270)$ with $J^{PC} = 1^{-\pm}$, are also investigated, some of which can be searched for in the future experiments.

Category

talk

Primary author: DONG, Xiang-Kun (ITP, CAS)

Co-authors: Prof. ZOU, Bingsong (ITP, CAS); LIN, Yong-Hui (Helmholtz Institute for Radiation and Nuclear Physics, University of Bonn)

Presenter: DONG, Xiang-Kun (ITP, CAS)

Session Classification: Session 1

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

Improved radiative corrections to $\tau \to \pi(K)\nu_\tau[\gamma]$: reliable new physics tests

Thursday, 18 August 2022 22:20 (25 minutes)

The ratios $R_{\tau/P} \equiv \Gamma(\tau \to P\nu_\tau[\gamma])/\Gamma(P \to \mu\nu_\mu[\gamma])(P = \pi, K)$ provide sensitive tests of lepton universality $|g_\tau/g_\mu| = 1$ and are a useful tool for new physics searches. We improve previous computations of the corresponding radiative corrections, within Chiral Perturbation Theory with resonances, complying with known QCD limits. We find $\delta R_{\tau/\pi} = (0.18 \pm 0.57)\%$ and $\delta R_{\tau/K} = (0.97 \pm 0.58)\%$, where the uncertainties are induced fundamentally by the counterterms. We test lepton universality, obtaining $|g_\tau/g_\mu|(\pi) = 0.9964 \pm 0.0038$ and $|g_\tau/g_\mu|(K) = 0.9857 \pm 0.0078$, and analyze the CKM unitarity, getting results at 2.1σ and 1.5σ from unitarity via $|V_{us}/V_{ud}|$ and $|V_{us}|$, respectively. We also update the search for non-standard interactions in one-meson τ decays.

Category

talk

Primary author: ROIG, Pablo (Cinvestav, Mexico)

Presenter: ROIG, Pablo (Cinvestav, Mexico)

Session Classification: Session 4

Contribution ID: **72** Type: **not specified**

Measurement of Branching Fractions of Singly Cabibbo-suppressed Decays $\Lambda_c^+ \to \Sigma^+ K_S^0$ and $\Sigma^0 K^+$

Wednesday, 17 August 2022 18:35 (10 minutes)

Based on a sample of $4.4 fb^{-1}$ of e^+e^- annihilation data collected in the energy region between 4.6 GeV and 4.7 GeV with the BESIII detector at BEPCII, two singly Cabibbo-suppressed decays $\Lambda_c^+ \to \Sigma^0 K^+$ and $\Lambda_c^+ \to \Sigma^+ K_S^0$ are studied. New determinations of the BFs of $\Lambda_c \to \Sigma K$ decays, in particular the mode and $\Lambda_c^+ \to \Sigma^+ K_S^0$, are important for validating and improving these theoretical-model calculations. Furthermore, improved measurements may clarify the tension between the predictions in different models. The branching fractions $\mathcal{B}(\Lambda_c^+ \to \Sigma^0 K^+)$ and $\mathcal{B}(\Lambda_c^+ \to \Sigma^+ K_S^0)$ are determined to be $(4.7 \pm 0.9(stat.) \pm 0.1(syst.) \pm 0.3(ref.)) \times 10^{-4}$ and $(4.8 \pm 1.4(stat.) \pm 0.2(syst.) \pm 0.3(ref.)) \times 10^{-4}$, respectively. The branching fraction of $\Lambda_c^+ \to \Sigma^+ K_S^0$ decay is measured for the first time. With the additional data which are foreseen to be collected near the Λ_c pair threshold in the coming years, we expect our measurements to improve in precision, and shed more light on the topic of charmed baryon decays.

Category

poster

Primary author: SU, Yangjie (University of Chinese Academy of Sciences)

Presenter: SU, Yangjie (University of Chinese Academy of Sciences)

Session Classification: Posters

Track Classification: Posters

Contribution ID: **73** Type: **not specified**

Search for semi-leptonic decays $\Lambda_c^+ \to \Lambda\pi^+\pi^-e^+\nu_e$ and $\Lambda_c^+ \to pK_S\pi^-e^+\nu_e$

Wednesday, 17 August 2022 18:45 (10 minutes)

Based on $4.4fb^{-1}$ of e^+e^- annihilation data collected in the energy region between 4.6 GeV and 4.7 GeV with the BESIII detector at the BEPCII collider, we search for semi-leptonic decays $\Lambda_c^+ \to \Lambda\pi^+\pi^-e^+\nu_e$ and $\Lambda_c^+ \to pK_S\pi^-e^+\nu_e$, using double tag technique. The measurement of $\Lambda_c^+ \to \Lambda^*e^+\nu_e$ is important for validating different theoretical-model calculations and helping us understand the nature of Λ^* baryon resonances. Since there is no significant signal on data, we set upper limits on branching fractions at 90% confidence level. This analysis will enhance our knowledges of charmed baryon decays.

Category

poster

Primary author: YU, Xudong (Peking University)

Presenter: YU, Xudong (Peking University)

Session Classification: Posters

Track Classification: Posters

Contribution ID: **74** Type: **not specified**

Partial wave analysis of the charmed baryon hadronic decay $\Lambda_c^+ \to \Lambda\pi^+\pi^0$

Wednesday, 17 August 2022 19:05 (10 minutes)

Based on e^+e^- collision samples corresponding to an integrated luminosity of $4.4\ fb^{-1}$ collected with BESIII detector at center-of-mass energies between 4.6 GeV to 4.7 GeV, the first partial wave analysis of the charmed baryonic decay $\Lambda_c^+ \to \Lambda\pi^+\pi^0$ is performed. From the analysis results, the decays of $\Lambda_c^+ \to \Lambda\rho(770)^+$ and $\Sigma(1385)\pi$ are studied for the first time. In combination with the world average branching fraction $\mathcal{B}(\Lambda_c^+ \to \Lambda\pi^+\pi^0)$, we determine their absolute branching fractions for the first time. In addition, according to the results of the amplitudes from the partial wave analysis, their decay asymmetry parameters can also be obtained. These results are the first measurements in the world.

Category

poster

Primary author: XIE, Xinhai (Peking University)

Presenter: XIE, Xinhai (Peking University)

Session Classification: Posters

Track Classification: Posters

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

Search for the lepton flavor violating decay $J/\psi \to e\mu$

Wednesday, 17 August 2022 19:15 (10 minutes)

We present a search for the lepton flavor violating decay $J/\psi \to e\mu$ using 8.998×10^9 J/ψ events collected with the BESIII detector at the BEPCII e^+e^- storage ring. No excess of signal above background is observed; we therefore set an upper limit on the branching fraction of $J/\psi \to e\mu < 4.5 \times 10^{-9}$ at the 90% confidence level. Improving the previous best result by a factor of more than 30, this measurement places the most stringent limit to date on lepton flavor violation in the heavy quarkonium sector.

Category

poster

Primary author: SONG, Tianzi (Sun Yat-sen University)

Presenter: SONG, Tianzi (Sun Yat-sen University)

Session Classification: Posters

Track Classification: Posters

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

Search for the rare weak decay $J/\psi \to De\nu_e$

Wednesday, 17 August 2022 18:05 (10 minutes)

Using 10.1×10^9 J/ψ events produced by the Beijing Electron Positron Collider (BEPCII) at a center-of-mass energy $\sqrt{s} = 3.097$ GeV and collected with the BESIII detector, we present a search for the rare semi-leptonic decay $J/\psi \to D^- e^+ \nu_e + c.c.$ No excess of signal above background is observed, and an upper limit on the branching fraction $\mathcal{B}(J/\psi \to D^- e^+ \nu_e + c.c.) < 7.1 \times 10^{-8}$ is obtained at 90% confidence level. This is an improvement of more than two orders of magnitude over the previous best limit.

Category

poster

Primary author: LI, Zhijun (Sun Yat-Sen University)

Presenter: LI, Zhijun (Sun Yat-Sen University)

Session Classification: Posters

Track Classification: Posters

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

Measurement of branching fractions for Λ_c^+ decays to $\Sigma^+K^+K^-$, $\Sigma^+\phi$ and $\Sigma^+K^+\pi^-(\pi^0)$

Wednesday, 17 August 2022 18:15 (10 minutes)

Based on analyzing $4.45\ fb^{-1}$ data taken at seven center-of-mass energies ranging from 4.600 to 4.699 GeV with the BESIII detector at the BEPCII collider, we measure the branching fractions for $\Lambda_c^+ \to \Sigma^+ + hadrons$ relative to $\Lambda_c^+ \to \Sigma^+\pi^+\pi^-$. By quoting the world average branching fraction of $\Lambda_c^+ \to \Sigma^+\pi^+\pi^-$, their branching fractions are measured.

Category

poster

Primary author: LI, Jingshu (Sun Yat-Sen (Zhongshan) University)

Presenter: LI, Jingshu (Sun Yat-Sen (Zhongshan) University)

Session Classification: Posters

Track Classification: Posters

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

Measurement of CP violation of neutral kaon system at the Super Tau-Charm Factory

Wednesday, 17 August 2022 18:55 (10 minutes)

In this paper, we present a preliminary study of CP violation effect of $K^0 - \bar{K}^0$ system in J/ψ decay. The CP violation parameters η_{+-} and η_{00} as well as their corresponding phase ϕ_{+-} and ϕ_{00} can be determined by the difference of the time-dependent decay rates between K^0 and $\bar{K}^0$ produced from $J/\psi \to K^-\pi^+K^0 + c.c.$ processes. We investigate the precisions of the measurements of the CP violation effect at the Super Tau-Charm Factory(STCF), a e^+e^- collider with a peak luminosity of 10^{35} $\mathrm{cm}^{-2}\mathrm{s}^{-1}$. The parameters η_{+-} and its phase ϕ_{+-} can be measured at a relative precision of 1×10^{-3}, which the statistical accuracy will be several times better than that of the existing PDG average values.

Category

poster

Primary author: ZHANG, Jianyu

Presenter: ZHANG, Jianyu

Session Classification: Posters

Track Classification: Posters

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

Lattice QCD calculations of charmed baryon form factors

Monday, 15 August 2022 14:40 (30 minutes)

There have been many progresses on weak decays of charmed baryons from theoretical and experimental sides. In this talk, I will give an overview of recent lattice QCD efforts, and will mostly focus on the $\Xi_c \to \Xi$ transitions, which are based on the newly generated lattice configurations.

Category

talk

Primary author: WANG, Wei (Shanghai JiaoTong University)

Presenter: WANG, Wei (Shanghai JiaoTong University)

Session Classification: Session 1

Contribution ID: **81** Type: **not specified**

The MUonE experiment: theory status

Tuesday, 16 August 2022 18:00 (25 minutes)

The CERN MUonE experiment aims at a new and independent determination of the leading order correction to the muon anomalous magnetic moment, through a high-precision measurement of the hadronic contribution to the running of the QED coupling constant in elastic $\mu e \to \mu e$ events, by exploiting 160 GeV muons scattering on atomic electrons. The required precision in the measurement of the differential cross sections at the 10ppm level demands for theory predictions at the same level of accuracy for a meaningful data analysis. In this context, the talk will review the efforts completed in the last years by an active theory community to calculate radiative corrections to the elastic process at NNLO in QED and their implementation into Monte Carlo event generators. Finally, the talk will indicate future developments needed to achieve the ultimate theoretical accuracy.

Category

talk

Primary author: CARLONI CALAME, Carlo (INFN, Sezione di Pavia)

Presenter: CARLONI CALAME, Carlo (INFN, Sezione di Pavia)

Session Classification: Session 2

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

Lepton universality tests and Vus calculation with the new radiative corrections for tau hadronic decays

Thursday, 18 August 2022 22:45 (25 minutes)

The HFLAV tau branching fraction fit results are used to compute lepton universality tests and Vus, using the recently published radiative corrections for the tau hadronic branching fractions. The HFLAV tau fit is included in the HFLAV report that has been recently submitted for publication.

Category

talk

Primary author: LUSIANI, Alberto (Scuola Normale Superiore)

Presenter: LUSIANI, Alberto (Scuola Normale Superiore)

Session Classification: Session 4

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

Michel parameters in the presence of massive Dirac and Majorana neutrinos

Thursday, 18 August 2022 20:45 (25 minutes)

We analyse the effects of Dirac and Majorana neutrinos on leptonic lepton decays using the most general four-lepton effective interaction Hamiltonian of dimension six. We calculate the specific energy and angular distribution of the final charged lepton, complemented with the decaying and final charged lepton polarization. We discuss the new generalized Michel parameters and focus on the effects of the heavy neutrino masses that would lead to sizable contributions on scenarios where the new sterile neutrinos have non-negligible mixing. Specifically, the most promising scenario is found for the case of τ decay with one heavy final-state neutrino with a mass around $10^2 - 10^3$ MeV, the linear term suppression could be of order 10^{-3}, low enough to be measured in current and forthcoming experiments.

Category

talk

Primary author: MARQUEZ, Juan (C)

Presenter: MARQUEZ, Juan (C)

Session Classification: Session 3

Contribution ID: **84** Type: **not specified**

Measuring the radiative width of the $\rho(770)$ and testing the chiral anomaly at COMPASS

Thursday, 18 August 2022 17:40 (25 minutes)

The COMPASS experiment at CERN has collected an extensive data set during the years 2009 and 2012 with a pion beam impinging on nuclear targets. In this data set, a lot of Primakoff events are recorded, which are characterized by a single-photon interaction with the beam pion. The Primakoff events allow us to measure the radiative width of the $\rho(770)$ meson via the reaction $\pi^- + \gamma^{(*)} \to \rho^- \to \pi^- + \pi^0$. When the two pions of the final state couple directly to the photon, we can also test the chiral anomaly by determining the cross section for the $\gamma 3\pi$-vertex. In the talk, we will present recent progress in the analysis of the $\pi^-\pi^0$ final state of Primakoff reactions at COMPASS.

Category

talk

Primary author: ECKER, Dominik (T)

Co-authors: Dr GUSKOV, Alexey (JINR); Mr MALTSEV, Andrei (JINR); Dr RYABCHIKOV, Dmitri (JINR); Dr FRIEDRICH, Jan (Technical University Munich); Prof. PAUL, Stephan (Technical University Munich)

Presenter: ECKER, Dominik (T)

Session Classification: Session 2

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

Line shape measurement of the $\chi_c(3872)$ with PANDA

Wednesday, 17 August 2022 19:55 (25 minutes)

In the last two decades plenty of new so-called XYZ-states in the charmonium mass region have been discovered, many of which are still under investigation. Amonge those, the $\chi_{c1}(3872)$ a.k.a. $X(3872)$ is the oldest and one of the most puzzling states. To identify the nature, in particular the exact line shape of the object needs to be determined. While current experiments such as LHCb even with high statistics still fail to unambigously distinguish between different line shape models, a precise energy scan with anti-protons envisaged by PANDA at FAIR will allow for a direct measurement and thus identify the nature.

Category

talk

Primary author: GOETZEN, Klaus (GSI Helmholtz Centre for Heavy Ion Research)

Co-author: Dr NERLING, Frank (HIM, GSI)

Presenter: GOETZEN, Klaus (GSI Helmholtz Centre for Heavy Ion Research)

Session Classification: Session 3

Contribution ID: **86** Type: **not specified**

Search for rare baryonic decays of beauty hadrons at LHCb

Thursday, 18 August 2022 19:55 (25 minutes)

The theoretical description of the dynamics behind baryonic decays of heavy flavoured particles is still very challenging. The branching ratio enhancement in multibody decays and the suppression of the branching fractions to two-body final states are interesting features of these processes. To better understand their underlying dynamics, more precise measurements are needed. In this presentation, the most recent results in the LHCb experiment in the search for charmless baryonic decays of beauty hadrons are reported.

Category

talk

Primary author: ZHAO, Haoqiang (Hunan University)

Co-author: Prof. YU, Jiesheng (Hunan University)

Presenter: ZHAO, Haoqiang (Hunan University)

Session Classification: Session 3

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

Singlet and non-singlet three-loop massive form factors

Friday, 19 August 2022 20:45 (25 minutes)

I will present our recent calculation of the singlet and non-singlet contributions to the massive form factors at three-loop order. The calculation is based on our powerful method to compute one-scale master integrals using differential quations combined with numerical matching. The latter is achieved with the help of deep expansions around regular and singular kinematic points. The resulting form factors have a wide range of henomenological applications since they enter as building blocks in numerous processes.

Category

talk

Primary author: SCHOENWALD, Kay (K)

Presenter: SCHOENWALD, Kay (K)

Session Classification: Session 3

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

On the nature of the T_{cc}^{+} state

Friday, 19 August 2022 16:25 (25 minutes)

The data on the charged tetraquark state T_{cc}^{+} recently discovered by the LHCb Collaboration are analysed in a coupled-channel scheme with the three-body effects included. The finite width of the D^{*} meson and the one-pion exchange between the D and D^{*} mesons are taken into account simultaneously and a high-quality fit is built to the line shape in the $DD\pi$ channel. It is argued that the data are consistent with the T_{cc}^{+} being a hadronic molecule generated by the interactions in the $D^{*+}D^{0}$ and $D^{*0}D^{+}$ channels. The low-energy constants of the amplitude are extracted from the fit and the properties of the T_{cc}^{+} spin partner state residing near the $D^{*}D^{*}$ threshold are discussed. Based on Phys.Rev.D 105 (2022) 014024 and Phys.Lett.B 833 (2022) 137290.

Category

talk

Primary author: NEFEDIEV, Alexey (LPI)

Presenter: NEFEDIEV, Alexey (LPI)

Session Classification: Session 2

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

The status of dark matter search in China

Monday, 15 August 2022 20:30 (30 minutes)

Dark matter particles beyond the standard model are still mystery in the world. The deep underground lab and space satellite are used to search for dark matter particles. China JinPing underground Lab (CJPL) comes at 21 century as the deepest and largest lab in the world. The direct detection dark matter experiments of CDEX and PandaX were carried out in CJPL, they have achieved many world-class results. For example, the best constraints of light and heavy dark matter were presented at that time. The indirect detection dark matter experiment (space satellite) of DAMPE was also launched, it has achieved significant detection accuracy. Therefore, the recent status of dark matter search in China is reviewed in this report.

Category

talk

Primary authors: Prof. LIU, Jianglai (SJTU); ZHAO, Li (SJTU)

Presenter: ZHAO, Li (SJTU)

Session Classification: Session 3

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

Search for the process $e^+e^- \to D^*(2007)$ with the CMD-3 detector

Thursday, 18 August 2022 20:20 (25 minutes)

A search for the process $e^+e^- \to D^{*0}(2007)$ has been performed with the CMD-3 detector at the VEPP-2000 e^+e^--collider. Two main decay modes $D^0\pi^0$ and $D^0\gamma$ with $D^0 \to K^+\pi^-\pi^+\pi^-$ and $D^0 \to K^+\pi^-\pi^0$ are used in this analysis. Using an integrated luminosity of $25.5\ nb^{-1}$ collected at the center-of-mass energy $E_{c.m.} = 2006.62$ MeV we preliminary get an upper limit for $\mathcal{B}(D^{*0} \to e^+e^-) < 6 \times 10^{-7}$ at 90% C.L.

Category

Primary author: SHEMYAKIN, Dmitry (B)

Presenter: SHEMYAKIN, Dmitry (B)

Session Classification: Session 3

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

Radiative Decay Width of $J/\psi \to \gamma\eta$ from $N_f = 2$ Lattice QCD

Friday, 19 August 2022 17:40 (25 minutes)

We present the first lattice QCD calculation of partial decay width from J/ψ to $\gamma\eta$ to confirm that QCD $U_A(1)$ anomaly enhances the coupling of gluons with flavor singlet pseudoscalar mesons. The lattice simulation is carried out using $N_f = 2$ lattice QCD gauge configurations at the pion mass $m_\pi \approx 350$ MeV. In particular, the distillation method has been utilized to calculate light quark loops. The results are reported here with the mass $m_\eta = 718(8)$ MeV and the decay width $\Gamma(J/\psi \to \gamma\eta) = 0.385(45)$ keV. By assuming the dominance of $U_A(1)$ anomaly and flavor singlet-octet mixing angle $\theta = -24.5°$, the production rates for the physical η and η' in J/ψ radiative decay are predicted to be $1.15(14) \times 10^{-3}$ and $4.49(53) \times 10^{-3}$, respectively. Our results agree well with the experimental measurement data and confirm that $U_A(1)$ anomaly plays an important role in the J/ψ radiative decay. Lattice QCD provides a promising approach for the studies of light hadrons generated from J/ψ.

Category

talk

Primary author: JIANG, Xiangyu (Institute of High Energy Physics, Chinese Academy of Sciences)

Co-authors: Mr CHEN, Feiyu (Institute of High Energy Physics, Chinese Academy of Sciences); Prof. GONG, Ming (Institute of High Energy Physics, Chinese Academy of Sciences); Prof. LI, Ning (School of Science, Xi'an Technological University); Dr ZHANG, Renqiang (Institute of High Energy Physics, Chinese Academy of Sciences); Dr SUN, Wei (Institute of High Energy Physics, Chinese Academy of Sciences); Prof. CHEN, Ying (Institute of High Energy Physics, Chinese Academy of Sciences); Prof. LIU, Zhaofeng (Institute of High Energy Physics, Chinese Academy of Sciences)

Presenter: JIANG, Xiangyu (Institute of High Energy Physics, Chinese Academy of Sciences)

Session Classification: Session 2

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

Search for darkonium in e^+e^- collisions at $BABAR$

Wednesday, 17 August 2022 21:30 (25 minutes)

Many scenarios of physics beyond the Standard Model predict dark sectors containing new particles interacting only feebly with ordinary matter. Collider searches for these scenarios have largely focused on identifying signatures of new mediators, leaving much of the dark sector structure unexplored. We investigate the existence of a light dark-matter bound state, the darkonium, Υ_D), predicted in minimal dark sector models, which can be produced through the reaction $e^+e^- \to \gamma\Upsilon_D$, with $\Upsilon_D \to A'A'A'$ and the dark photons A' decaying to pair of leptons or pions. This search explores new dark sector parameter space, illustrating the importance of B-factories in fully probing low-mass new physics. The results are based on the full data set of about 500 fb^{-1} collected at the $\Upsilon(4S)$ resonance by the $BABAR$ detector at the PEP-II collider.

Category

talk

Primary author: ECHENARD, Bertrand (Califortnia Institute of Technology)

Presenter: ECHENARD, Bertrand (Califortnia Institute of Technology)

Session Classification: Session 4

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

T-odd asymmetry in radiative hadronic tau decays

Friday, 19 August 2022 14:25 (25 minutes)

I will first discuss the hadronic contributions to the $\tau \to \pi\pi\gamma\nu$ process. Distinct hadron effects are revealed in different two-particle invariant mass spectra. I will then focus on the T-odd asymmetry from the radiative two-pion decays and intriguing non-vanishing asymmetry distributions are predicted, which may provide useful guidelines to future measurements at Belle-II and super tau-charm facilities.

Category

talk

Primary author: GUO, Zhi-Hui (Hebei Normal University)

Presenter: GUO, Zhi-Hui (Hebei Normal University)

Session Classification: Session 1

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

Fit of the $a_1(1420)$ as a Triangle Singularity

Friday, 19 August 2022 17:15 (25 minutes)

Recently, many new hadronic states were found that do not fit into the simple constituent-quark model for mesons and baryons. One prominent example is the $a_1(1420)$ signal that was observed by the COMPASS experiment in the $f_0(980)\pi$ P-wave with $J^{PC} = 1^{++}$ quantum numbers.

Different mechanisms were suggested to explain these signals, one of which is rescattering of final-state particles. The Triangle Singularity (TS) is a prominent rescattering mechanism that is able to produce signals that fully mimic the behavior of a resonance, i.e. a peak in the intensity accompanied by a phase motion of the amplitude.

We present our analysis of the $f_0(980)\pi$ amplitude using a TS model that incorporates spin effects via a dispersion technique. We will show that the $a_1(1420)$ signal is explained by a TS that appears in the decay of the ground-state axial-vector meson $a_1(1260)$ to the $K\bar{K}\pi$ final state, which couples to the observed $f_0(980)\pi$ system in the 3π final state via rescattering.

Category

talk

Primary author: WAGNER, Mathias (COMPASS Collaboration)

Presenter: WAGNER, Mathias (COMPASS Collaboration)

Session Classification: Session 2

Contribution ID: **95** Type: **not specified**

Observing true tauonium via two-photon fusion at e+e– colliders

Tuesday, 16 August 2022 16:20 (25 minutes)

The feasibility of observing true tauonium, the bound state of two tau leptons, $\mathcal{T}_0 \equiv (\tau^+\tau^-)_0$, via photon-photon collisions at e^+e^- colliders and at the LHC, is studied. The production cross sections of the process $\gamma\gamma \to \mathcal{T}_0 \to \gamma\gamma$ —as well as those of all relevant backgrounds: spin-0 and 2 charmonium resonances decaying to diphotons, and light-by-light scattering— are computed in the equivalent photon approximation for e^+e^- collisions at BES III ($\sqrt{s} = 3.8$ GeV), Belle II ($\sqrt{s} = 10.6$ GeV), and FCC-ee ($\sqrt{s} = 91.2$ GeV), as well as for ultraperipheral p-p, p-Pb, and Pb-Pb collisions at the LHC. Despite small $\mathcal{T}_0$ production cross sections and a final state swamped by decays from overlapping pseudoscalar and tensor charmonium states —the χ_{c2}, $\eta_c(2S)$, and χ_{c0} states have masses only 2.5, 84, and 139 MeV away, respectively, from the $\mathcal{T}_0$ peak— evidence a nd observation of the ground state of the heaviest leptonium appears feasible at Belle II and FCC-ee, respectively, with in-situ high-precision measurements of the irreducible charmonium backgrounds.

Category

talk

Primary author: D\'ENTERRIA, David (C)

Co-author: Mr SHAO, Hua-Sheng (Peking University)

Presenter: D\'ENTERRIA, David (C)

Session Classification: Session 2

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

Triangle singularities in the production of $X(3872)$ and $T_{cc}^{+}(3875)$

Friday, 19 August 2022 16:50 (25 minutes)

If the $X(3872)$ or $T_{cc}^{+}(3875)$ is a weakly bound charm-meson molecule, it can be produced by the creation of $D^{*}\bar{D}^{*}$ or $D^{*}D^{*}$ at short distances followed by the rescattering of the charm mesons into $X(3872)$ or $T_{cc}^{+}(3875)$ and a pion or a photon through a triangle loop. A triangle singularity produces narrow peak in the reaction rate in production of $X(3872)$ or $T_{cc}^{+}(3875)$. The observation of this peak would provide strong evidence in support of the identification of the $X(3872)$ or $T_{cc}^{+}(3875)$ as a charm-meson molecule.

Category

talk

Primary authors: BRAATEN, Eric (Ohio State University); JIANG, Jun (Shandong University); INGLES, Kevin (Ohio State University); HE, Liping (University of Bonn)

Presenter: HE, Liping (University of Bonn)

Session Classification: Session 2

Contribution ID: **97** Type: **not specified**

Status of Super charm-tau factory project

Monday, 15 August 2022 19:30 (30 minutes)

The Super Charm-Tau Factory (SCTF) is a proposed e^+e^- collider operating in the c.m. energy range from 3 to 7 GeV with a luminosity of $10^{35}cm^{-2}s^{-1}$, two orders of magnitude more than that of BEPC-II, the existing collider operating in the same energy range. The SCT experiment will provide a comprehensive study of charmed and light hadrons and a tau lepton, aimed at deep understanding of QCD phenomenology at intermediate energy and precise tests of the Standard Model. The longitudinal polarization of the electron beam at the interaction point greatly enriches the physical program of the experiment. The status of SCTF project will be discussed, including the physics program of the SCT experiment, the conceptual design of a particle detector and ongoing work on prototyping the SCT detector subsystems.

Category

talk

Primary author: LOGASHENKO, Ivan (Budker Institute of Nuclear Physics)

Presenter: LOGASHENKO, Ivan (Budker Institute of Nuclear Physics)

Session Classification: Session 3

Contribution ID: **98** Type: **not specified**

Effective field theories for doubly heavy hadronic molecules

Monday, 15 August 2022 17:35 (30 minutes)

A short overview of the effective-field-theory approach for analysing the doubly heavy near-threshold states in the experimental line shapes is presented. Several applications to the LHCb pentaqurks, the bottomoniumlike states $Z_b(10610)$ and $Z_b(10650)$, and the T_{cc}^+ are discussed. The role of the one-pion exchange in the effective hadronic potential on the results is reviewed.

Category

Primary author: BARU, Vadim (Bochum University)

Presenter: BARU, Vadim (Bochum University)

Session Classification: Session 2

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

Current Status of Muon g-2 Experiment at Fermilab

Monday, 15 August 2022 16:35 (30 minutes)

The Fermilab Muon $g-2$ Experiment aims to make precise measurements of the anomalous magnetic moment (a_μ) of the muon. The first measurement of the experiment is 3.3σ larger than the Standard Model (SM) prediction. The measurement is in good agreement with the previous result with improved precision. The uncertainty of the measurement is 0.46 ppm which gives the most precise measurement on a_μ up to date. The new world average value is 4.2σ larger than the SM prediction. This result further strengthens the evidence for new physics beyond the Standard Model (BSM).

The analysis of Run 2+3 is underway. With improvement and optimization after Run1, the systematic uncertainties will be further reduced. In early July, the Run 5 data taking was finished. Up to date, about 19xBNL data in total were collected.

Category

talk

Primary author: LI, Bingzhi (Shanghai Jiao Tong University)

Presenter: LI, Bingzhi (Shanghai Jiao Tong University)

Session Classification: Session 2

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

Probing the new physics through the exclusive decay of Higgs and Z boson

Friday, 19 August 2022 14:50 (25 minutes)

The rare decays of the Higgs and Z bosons to a vector quarkonium and a photon have been widely studied, especially for the exclusive decay from the Higgs boson since it could be used to constrain the light quark Yukawa coupling and its CP violation. In this talk, I will discuss the possibility to probe the other new physics effects through these rare decay. We demonstrate that the rare decays from Z boson can be used to probe the Zbb coupling, while the decays from Higgs boson can be used to exclude the degeneracy of the Higgs photon coupling from the global analysis of the Higgs data at the LHC.

Category

talk

Primary author: YAN, Bin

Presenter: YAN, Bin

Session Classification: Session 1

Contribution ID: **102** Type: **not specified**

Muon g-2 from lattice QCD

Wednesday, 17 August 2022 20:45 (25 minutes)

Fermilab has just announced a new experimental result for muon g-2. The statistical uncertainty of the new result is similar to the previous BNL result and the central value is consistent. The combined value is now 4.2 standard deviations away from the Standard Model prediction. For the Standard Model prediction, the two hadronic contributions, HVP (hadronic vacuum polarization) and HLbL (hadronic light-by-light) are the dominant sources of uncertainty. I will review the lattice calculations in determining these two hadronic contributions.

Category

Primary author: JIN, Luchang (University of Connecticut)

Presenter: JIN, Luchang (University of Connecticut)

Session Classification: Session 3

Contribution ID: **103** Type: **not specified**

How to identify compact multiquarks in the heavy quark sector

Friday, 19 August 2022 16:00 (25 minutes)

We will present recent analyses on how lineshape studies can shed light on the nature of several exotic candidates

Category

talk

Primary author: PILLONI, Alessandro (Universita' La Sapienza di Roma)

Presenter: PILLONI, Alessandro (Universita' La Sapienza di Roma)

Session Classification: Session 2

Contribution ID: **104** Type: **not specified**

On the $\eta_1(1855)$ as a hadronic molecular state and its SU(3) partners

Wednesday, 17 August 2022 18:25 (10 minutes)

In this work, we interpret the newly $\eta_1(1855)$ resonance with exotic $J^{PC} = 1^{-+}$ quantum numbers in the $I = 0$ sector, reported by BESIII collaboration, as a dynamically generated state from the interaction between the lightest pseudoscalar mesons and vector mesons. The interaction is derived from the lowest order chiral Lagrangian from which the Weinberg-Tomozawa term is obtained, describing the transition amplitude among the relevant channels, which are then unitarized using the Bethe-Salpeter equation, according to the chiral unitary approach. In addition, we evaluate the $\eta_1(1855)$ decays into the $\eta\eta'$ and $K\bar{K}^*\pi$ channels. Furthermore, we have also investigated its SU(3) partners, and according to our findings, the $\pi_1(1400)$ and $\pi_1(1600)$ structures may correspond to dynamically generated states, with the former one coupled mostly to the $b_1\pi$ component and the latter one coupled to the $f_1(1420)\pi$, $K_1(1270)\bar{K}$, and $K_1(1400)\bar{K}$ channels. In particular, our result for the ratio $\Gamma(\pi_1(1600) \to f_1(1285)\pi)/\Gamma(\pi_1(1600) \to \eta'\pi)$ is consistent with the one listed in the Review of Particle Physics, which supports our interpretation for the higher π_1 state. Finally, we also report poles in the $I = 1/2$ sector and discuss their influence on the line shape of the ϕK mass spectra, around 1770 MeV, in the $B \to J/\psi\phi K$ decays reported by the LHCb collaboration.

Category

poster

Primary author: YAN, Mao-Jun (ITP, CAS)

Co-authors: Prof. ZOU, Bing-Song; Prof. GUO, Feng-Kun; Dr DIAS, Jorgivan

Presenter: YAN, Mao-Jun (ITP, CAS)

Session Classification: Posters

Track Classification: Posters

Contribution ID: **105** Type: **not specified**

Prediction of a narrow exotic hadronic state with quantum numbers J^{PC}=0^{−}

Wednesday, 17 August 2022 18:35 (10 minutes)

Lots of charmonium-like structures have been observed. Most of them share the same quantum numbers with conventional charmonium states, with exceptions of those with an electric charge and/or strangeness. We show that a neutral and zero-strangeness charmonium-like exotic state with quantum numbers $J^{PC} = 0^{--}$, denoted as $\psi_0(4360)$, is a robust prediction in the hadronic molecular scenario, where the $\psi(4230), \psi(4360)$ and $\psi(4415)$ are identified as $D\bar{D}_1, D^*\bar{D}_1$ and $D^*\bar{D}_2^*$ bound states, respectively; the mass and width are predicted to be (4366 ± 18)˜MeV and less than 10˜MeV, espectively. The interactions are calculated by the t-channel vector and pseudoscalar meson exchanges assisted by heavy quark spin symmetry. The coupled-channel effects and the u-channel pion exchange including full 3-body effects of the $D^*\bar{D}^*\pi$ intermediate states are carefully examined. The $\psi_0(4360)$ is significant in two folds: no 0^{--} hadron has been observed so far, and a study of this state will enlighten the understanding of the mysterious vector mesons between 4.2 and 4.5˜GeV. We propose that such an exotic state can be searched for in $e^+e^- \to \eta\psi_0(4360)$ and uniquely identified by measuring the angular distribution of the outgoing η meson.

Category

poster

Primary authors: ZOU, Bingsong (ITP, CAS); GUO, Feng-Kun (ITP, CAS); JI, Teng; DONG, Xiang-Kun (ITP, CAS)

Presenter: JI, Teng

Session Classification: Posters

Track Classification: Posters

Contribution ID: **106** Type: **not specified**

Open speech I

Monday, 15 August 2022 14:00 (10 minutes)

Session Classification: Session 1

Contribution ID: **107** Type: **not specified**

Open speech II

Session Classification: Session 1

Contribution ID: **108** Type: **not specified**

Light Meson Spectroscopy at BESIII

Tuesday, 16 August 2022 13:55 (25 minutes)

Presenter: LI, Linjian

Session Classification: Session 1

Contribution ID: **109** Type: **not specified**

Update on strong and radiative decays of the $D^*_{s0}(2317)$ and $D_{s1}(2460)$ and their bottom cousins

Wednesday, 17 August 2022 18:45 (10 minutes)

The isospin breaking and radiative decay widths of the positive-parity charm-strange mesons, D^*_{s0} and D_{s1}, and their predicted bottom-strange counterparts, B^*_{s0} and B_{s1}, as hadronic molecules are revisited. This is necessary, since the B^*_{s0} and B_{s1} masses used in (Cleven et al., Eur Phys J A 50:149, 2014) were too small, in conflict with the heavy quark flavour symmetry. Furthermore, not all isospin breaking contributions were considered. We here present a method to restore heavy quark flavour symmetry, correcting the masses of B∗s0 and Bs1, and include the complete isospin breaking contributions up to next-to-leading order. With this we provide updated hadronic decay widths for all of D^*_{s0}, D_{s1}, B^*_{s0} and B_{s1}. Results for the partial widths of the radiative decays of $D^*_{s0}(2317)$ and $D_{s1}(2460)$ are also renewed in light of the much more precisely measured D^*_+ width. We find that $B_s\pi_0$ and $B_s\gamma$ are the preferred channels for searching for B^*_{s0} and B_{s1}, respectively.

Category

poster

Primary authors: Prof. HANHART, Christoph (Institute for Advanced Simulation, Institut für Kernphysik and Jülich Center for Hadron Physics); Prof. GUO, Feng-Kun (ITP,CAS); FU, Hailong (ITP,CAS); Prof. GRIESSHAMMER, Harald W. (Institute for Nuclear Studies, Department of Physics, The George Washington University); Prof. MEISSNER, Ulf-G. (Institute for Advanced Simulation, Institut für Kernphysik and Jülich Center for Hadron Physics ;Germany Helmholtz-Institut für Strahlen- und Kernphysik and Bethe Center for Theoretical Physics, Universität Bonn;Tbilisi State University, 0186, Tbilisi, Georgia)

Presenter: FU, Hailong (ITP,CAS)

Session Classification: Posters

Track Classification: Posters

Contribution ID: **111** Type: **not specified**

Search for Muon to Electron Conversion on COMET

Wednesday, 17 August 2022 18:55 (10 minutes)

In the Standard Model, Flavor-changing-neutral-current (FCNC) in quark sector is predicted at loop level. In the lepton sector, the lepton-flavor-violation (LFV) was evident after the discovery of neutrino oscillation. In the SM, even considering the tiny masses and oscillation of neutrinos, the predicted decay rate for charged-lepton-flavor-violation (cLFV), such as muon-electron conversion, is still tiny (less than 10^-54), which can not be detected in experiment. However, New Physics contributions can enhance the muon-electron conversion rate, and lead to observable signal. The COMET experiment is proposed to search for the muon-electron conversion with the sensitivity will be improved by order of 4 magnitudes comparing to the current upper limit. Any experimental evidence of cLFV will indicate signal of New Physics.

Category

poster

Primary authors: ZHANG, Yao (Institute of high energy physics, Beijing China); YUAN, Ye (高能所)

Presenter: ZHANG, Yao (Institute of high energy physics, Beijing China)

Session Classification: Posters

Track Classification: Posters

Contribution ID: **112** Type: **not specified**

Muon g-2: data-driven HVP from KNT

Wednesday, 17 August 2022 20:20 (25 minutes)

Last year, the Muon g-2 experiment at Fermilab reported a value for the muon magnetic moment that disagrees with the theoretical SM prediction by 4.2 standard deviations. The potential to confirm the presence of a BSM muon interaction beyond 5 standard deviations rests heavily on improving the SM predictions for the muon magnetic moment, which is entirely dependent on improving evaluations of the hadronic vacuum polarisation (HVP). Currently, the most precise approach to evaluate the HVP is to use experimentally measured data of hadron production cross sections as input to dispersion integrals to calculate their contributions. This endeavour requires combining all available measurements and corresponding uncertainties for all individual hadronic final states in a statistically robust procedure, and then summing all contributions to arrive at a full evaluation of the total hadronic cross section. I will present the KNT analysis of this endeavour, reviewing the results of our most recent update, highlighting upcoming changes and areas for improvement.

Category

Primary author: KESHAVARZI, Alex (University of Manchester)

Presenter: KESHAVARZI, Alex (University of Manchester)

Session Classification: Session 3

Contribution ID: **113** Type: **not specified**

Possibility of $T_{c\bar{s}}(2900)$ as the resonance-like structure induced by threshold effects

Wednesday, 17 August 2022 19:05 (10 minutes)

We investigate the process $B \to \bar{D} D_s \pi$ via several rescattering processes. It is shown that the triangle singularity (TS) peak around the $D^* K^*$ threshold generated from the $\chi_{c1} K^* D^*$ loop is relatively narrow, which may simulate the resonance-like structure $T_{c\bar{s}}(2900)$ recently observed by LHCb in the $D_s \pi$ spectrum. However, the TS peak around the $D_s^* \rho$ threshold generated from the $D^{**} D_s^* \rho$ loop is smoothed by the broad width of ρ, which itself can hardly describe the $T_{c\bar{s}}(2900)$ structure. A non-resonance TS signal around the DK threshold generated from the $\chi_{c0} KD$ loop is also predicted.

Category

poster

Primary authors: LIU, Xiao-Hai (Tianjin University); GE, Ying-Hui (Tianjin University)

Presenter: GE, Ying-Hui (Tianjin University)

Session Classification: Posters

Track Classification: Posters

Contribution ID: **114** Type: **not specified**

TBD

Session Classification: Session 4

Contribution ID: **115** Type: **not specified**

Closing

Friday, 19 August 2022 23:10 (10 minutes)

Presenter: WANG, XiaoLong (Fudan University)

Session Classification: Session 4

Contribution ID: **116** Type: **not specified**

Parity-Violating Electron Scattering as a Test of the Standard Model

Friday, 19 August 2022 22:45 (25 minutes)

The technique of parity-violating electron scattering, involving measurements of the asymmetry in the scattering of longitudinally polarized electrons off fixed targets, has become increasingly precise over the past three decades. Such asymmetries are sensitive to weak neutral current interactions (mediated by the Z boson) between electrons and quarks, or between two electrons, and can be used to probe for the limits of validity of the electroweak theory in a manner complementary to direct searches for new physics at high energy scales at colliders. Experiments planned for the next decade in elastic electron-electron scattering (MOLLER at Jefferson Lab), elastic electron-proton scattering (P2 at the Mainz MESA facility), and parity-violating deep inelastic scattering (SOLID at Jefferson Lab), will significantly improve determinations of the electron ' s weak charge, proton ' s weak charge, and the axial-vector electron-quark coupling constants, respectively. All of these measured quantities can be used to extract values of the weak mixing angle at low energies that can be used to test the Standard Model and probe for new physics beyond the Standard Model at MeV and multi-TeV scales, complementary to direct searches at high energy colliders.

Category

talk

Primary author: ADHIKARI, Devi (Virginia Tech)

Presenter: ADHIKARI, Devi (Virginia Tech)

Session Classification: Session 4

Contribution ID: **117** Type: **not specified**

Towards the establishment of the light $J^{P(C)} = 1^{-(+)}$ hybrid nonet

Tuesday, 16 August 2022 14:20 (25 minutes)

Presenter: ZHAO, Qiang (Institute of High Energy Physics, Chinese Academy of Sciences)

Session Classification: Session 1

Contribution ID: **118** Type: **not specified**

TBD

Session Classification: Session 1

Contribution ID: **119** Type: **not specified**

Search for the Lepton Flavor Violation in Υ(3S)⟶e±μ∓

Friday, 19 August 2022 13:35 (25 minutes)

Presenter: TASNEEM, Nafisa (University of Victoria)

Session Classification: Session 1

Contribution ID: **120** Type: **not specified**

Toward understanding of exclusive heavy-quarkonium production at subleading power using soft-collinear theory

Wednesday, 17 August 2022 19:15 (10 minutes)

Presenter: WANG, Yunlu (Fudan)

Session Classification: Posters