

## HK 72: Hadron Structure and Spectroscopy XII

Time: Thursday 16:00–17:30

Location: HK-H8

**Group Report**

HK 72.1 Thu 16:00 HK-H8

**Role of a triangular singularity in the  $\gamma p \rightarrow p\pi^0\eta$  reaction** —  
 •VOLKER METAG and MARIANA NANOVA for the CBELSA/TAPS-Collaboration — II. Physikalisches Institut, Universität Giessen, Giessen

Recently structures in invariant mass distributions and excitation energy spectra have been attributed to triangular singularities as discussed in e.g., [1,2] and in the review by Guo et al. [3]. These singularities emerge under specific kinematic conditions when new reaction channels open up. It will be shown that a triangular singularity associated with the opening of the  $\gamma p \rightarrow p\pi^0\eta$  channel can explain the observation of a structure in the  $M_{p\eta}$  invariant mass distribution near 1700 MeV/c<sup>2</sup> in the  $\gamma p \rightarrow p\pi^0\eta$  reaction [4].

[1] G. D. Alexeev *et al.*, The COMPASS Collaboration, Phys. Rev. Lett **127**, 082501 (2021).

[2] M. Mikhasenko, B. Ketzner and A. Sarantsev, Phys. Rev. D **91**, 094015 (2015).

[3] F. K. Guo *et al.*, Rev. Mod. Phys. D **90**, 015004 (2018).

[4] V. Metag *et al.*, arXiv:2110.05155.

Supported by DFG through SFB/TR16.

HK 72.2 Thu 16:30 HK-H8

**Feasibility Studies of the  $f_1(1420)$  Meson Production in Two-Photon Fusion Processes at BESIII** — •NICK EFFENBERGER, CHRISTOPH FLORIAN REDMER, and ACHIM DENIG for the BESIII-Collaboration — Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Deutschland

The precision of the Standard Model prediction of the anomalous magnetic moment of the muon,  $a_\mu$ , is completely limited by the knowledge of the hadronic contributions. These are the hadronic Vacuum Polarization contribution as well as the hadronic Light-by-Light (HLbL) scattering contribution. For the latter, data-driven approaches have recently been developed. Recent estimates from such data-driven approaches demonstrate the importance of axial mesons with masses above 1 GeV for  $a_\mu^{\text{HLbL}}$ .

The BESIII experiment, located at the BEPCII collider in Beijing, China, has collected data with center-of-mass energies residing in the  $\tau$ -charm region. These can be used to study the production of axial mesons in two-photon fusion processes with quasi-real or virtual photons. In this presentation, we discuss the prospects of studying the  $f_1(1420)$  meson via its decay to the  $K^+K^-\pi^0$  final state.

HK 72.3 Thu 16:45 HK-H8

**Search for the Production of the  $f_1(1285)$  Resonance in  $e^+e^-$  Collisions using Initial State Radiation at BESIII** — •JAN MUSKALLA, ACHIM DENIG, CHRISTOPH FLORIAN REDMER, and RICCARDO ALIBERTI — Institut für Kernphysik, Johannes Gutenberg-Universität Mainz, Deutschland

Hadronic light-by-light scattering (HLbL) is a limiting process for the precision of the Standard Model prediction for the anomalous magnetic moment of the muon  $a_\mu$ . The uncertainty of  $a_\mu^{\text{HLbL}}$  can be improved using detailed measurements of transition form factors (TFF)

of the two-photon coupling to mesons. One such TFF study of interest is on the  $f_1(1285)$  meson which can be produced via two-photon fusion processes in  $e^+e^-$  annihilations. The BESIII experiment at the electron-positron collider in Beijing (BEPC-II) has collected the world's largest data sets in the  $\tau$ -charm energy region. Initial state radiation (ISR) allows for a search of the  $f_1$  resonance at energies below the center of mass energy of the collider. The decay channel  $e^+e^- \rightarrow f_1\gamma_{\text{ISR}} \rightarrow \pi^0\pi^0\eta\gamma_{\text{ISR}} \rightarrow 7\gamma$  is searched. If successful, this will shed light on the two-photon coupling to the  $f_1$  resonance ( $J^{PC} = 1^{++}$ ) since the resonance is only accessible in  $e^+e^-$  annihilation via a two-photon production process. To perform a blind analysis, Monte Carlo simulations for the signal and background channels are analyzed with the aim of performing the analysis on data sets from BESIII with a combined luminosity of 20 fb<sup>-1</sup>.

HK 72.4 Thu 17:00 HK-H8

**Proton- $\phi$  interaction studied in pp collisions with ALICE at the LHC** — •EMMA CHIZZALI for the ALICE-Collaboration — TUM, Munich, Germany

In order to constrain the equation of state of dense objects like neutron stars (NS) and subsequently solve the puzzle about their content, it is fundamental to understand the interaction between their hypothetical constituents. Hyperons might be contained in the core of NS which makes the hyperon-hyperon interaction relevant with the  $\phi$  vector meson as effective exchange particle. Additionally, it is an interesting particle regarding the partial restoration of chiral symmetry in the nuclear medium. For such investigations it is relevant to constrain the vacuum properties of the interaction between the  $\phi$  meson and nucleons. This can be studied experimentally by measuring the correlation function between proton and  $\phi$  meson employing the femtoscopy technique in small collision systems. The small source size in HM pp collisions at the Large Hadron Collider at  $\sqrt{s} = 13$  TeV makes it possible to study short-ranged strong potentials with unprecedented precision. The data used to derive the correlation function is measured by the ALICE experiment and corrected for non-genuine contributions. Finally, it is found to reflect the pattern of an attractive force between proton and  $\phi$  meson and employed to extract the scattering parameters of the interaction.

HK 72.5 Thu 17:15 HK-H8

**Messung des Verzweigungsverhältnisses des Zerfalls  $J/\psi \rightarrow \bar{p}\Sigma^+K_S^0 + c.c.$  am BESIII-Experiment** — •LEONARD WOLLENBERG und MIRIAM FRITSCH für die BESIII-Kollaboration — Ruhr-Universität Bochum

Das BESIII-Experiment am BEPC-2 Electron-Positron-Speicherring in Peking hat im Sommer 2018 die Datenaufnahme für den weltgrößten  $J/\psi$ -Datensatz beendet. Insgesamt wurden 10 Milliarden  $J/\psi$ -Ereignisse aufgezeichnet. Mit diesem Datensatz ist es möglich, sehr präzise Messungen der Zerfalleigenschaften des  $J/\psi$  durchzuführen. Von besonderem Interesse ist die Messung des Verzweigungsverhältnisses  $J/\psi \rightarrow \bar{p}\Sigma^+K_S^0 + c.c.$ , da diese Reaktion bisher nicht vermessen wurde. Bisher gibt es nur eine Messung des Verzweigungsverhältnisses des Isospin Partners Zerfalls  $J/\psi \rightarrow \bar{p}\Sigma^0K^+$ . In diesem Vortrag wird die erste Messung des Verzweigungsverhältnisses des Zerfall Kanals  $J/\psi \rightarrow \bar{p}\Sigma^+K_S^0 + c.c.$  präsentiert.