



Contribution ID: 191

Type: **Poster**

Hadronic Paschen-Back effect: P-wave charmonia under strong magnetic fields

Friday, 3 August 2018 18:15 (1 minute)

QCD dynamics under a strong magnetic field is of great interest to the field of relativistic heavy-ion collisions and magnetars.

In this talk, I will discuss a new effect we recently found in Ref.[1], 'Hadronic Paschen-Back effect (HPBE)', which is analogous to the Paschen-Back effect observed in atomic physics.

This effect is induced by the interplay between a strong magnetic field and finite orbital angular momenta in hadronic systems.

It allows the wave functions to drastically deform and leads to anisotropic decays.

Such a decay gives a possibility to measure the strength of the magnetic field in heavy-ion collision at LHC, RHIC and SPS, which has not experimentally been measured.

As an example of HPBE, I will report our results [1] of the mass spectra, wave functions, and mixing rates of P-wave charmonia in a wide range of magnetic fields by using the potential model and a numerical few-body technique.

Furthermore, I will talk about a systematic study for the radiative decays of P-wave quarkonia by HPBE based on potential non-relativistic QCD in Ref.[2].

[1] arXiv:1802.04971 [2] arXiv:1805.09787

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Session Classification: Poster

Track Classification: D: Deconfinement