Contribution ID: **12** Type: **Overview talk**

From CELSIUS to COSY: On the Observation of a Dibaryon Resonance

Tuesday, 11 November 2014 15:50 (40 minutes)

Within the program to systematically study the two-pion production in nucleon-nucleon collisions by CELSIUS/WASA also the ominous ABC effect was investigated, which denotes an unusual huge low-mass enhancement in the invariant mass spectrum of an isoscalar pion pair produced in double-pionic fusion process. Due to the lack of convincing explanations the effect got named after Abashian, Booth and Crowe, who were the first to observe this phenomenon in inclusive measurements back in 1960.

After having confirmed the ABC effect by exclusive and kinematically complete experiments at CELSIUS/WASA first indications of a correlation of this effect with a resonance-like structure in the total cross section were observed in the basic double-pionic fusion reaction np -> dpi0pi0 [1].

After the move of the WASA detector to COSY the two-pion production program could be continued with WASA-at-COSY with much superior intensity and precision. As a result the resonance effect could be established in all relevant two-pion channels and its quantum numbers determined to be I(JP) = 0(3+) [2-4].

If the hypothesis of a genuine dibaryon resonance is true, then it has to be observed also in neutron-proton scattering directly –though its effect is expected to be tiny. Since the analyzing power is the best observable to sense even tiny contributions to the
scattering amplitude, high-statistics measurements of polarized neutron-proton scattering have been performed over the region of the anticipated resonance with WASA-at-COSY. Incorporation of these new data into the SAID partial-wave analysis produces, indeed, a resonance pole in the 3D3-3G3 coupled partial waves at (2380±10 –i
40±5) MeV –in full agreement with the findings in the two-pion production channels and establishing thus the first observation of a dibaryon resonance[5].

References
[1] M. Bashkanov et al., Phys. Rev. Lett. 102, 052301 (2009).
[2] P. Adlarson et al., Phys. Rev. Lett. 106, 242302 (2011).
[3] P. Adlarson et al., Phys. Lett. B 721, 229 (2013)
[4] P. Adlarson et al., Phys. Rev. C 88, 055208 (2013)
[3] P. Adlarson et al., Phys. Rev. Lett. 112, 202301 (2014) and Phys. Rev. C 90, 035204 (2014).

Primary author: Prof. CLEMENT, Heinz (Physikalisches Institut, University of Tuebingen)

Presenter: Prof. CLEMENT, Heinz (Physikalisches Institut, University of Tuebingen)

Session Classification: SFS-KF

Track Classification: SFS-KF