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## The Curious Case of the $a_1(1420)$

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The unique nature of QCD leads to a rich spectrum of hadronic resonances. It is well understood that hadronic resonances, which arise from genuine QCD dynamics, are typically identified through peaks in the invariant mass distributions in experiments. However, there are also kinematic effects which produce peaks even though they don't correspond to any underlying QCD effect. One such example is the Landau singularity corresponding to the triangle diagram, which is a logarithmic singularity that can mimic a resonance. Such an effect was observed in the COMPASS experiment close to the  $a_1(1260)$  meson in the  $f_0(980)\pi$   $p$ -wave final state, which was tentatively called the  $a_1(1420)$  meson. However, further analyses improved our understanding that this was, in fact, a consequence of the Landau singularity arising from  $K^*(892)K$  rescattering. In a previous work, we studied this effect using a unitary three-body formalism (IVU) applied to a  $a_1(1420)$  meson-like toy-model without any ad-hoc assumptions, which further supported the Landau singularity hypothesis. We improve on this work, and apply the unitary three body formalism (IVU) to physical system and fit to the COMPASS data.

### Collaboration

**Primary authors:** SAKTHIVASAN, Ajay Shanmuga (University of Bonn); MAI, Maxim (University of Bern); DÖRING, Michael (The George Washington University); FENG, Yuchuan (The George Washington University)

**Presenter:** SAKTHIVASAN, Ajay Shanmuga (University of Bonn)

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