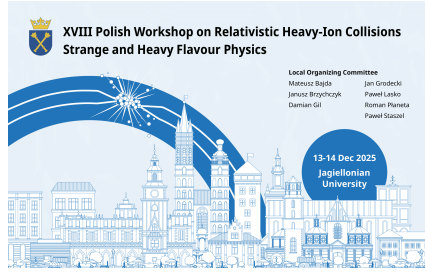


# XVIII Polish Workshop on Relativistic Heavy-Ion Collisions: Strange and Heavy Flavour Physics



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## Eta condensates on the extended Columbia plot with axial anomaly

*Sunday 14 December 2025 12:50 (15 minutes)*

CP violation is known to emerge at finite topological angle, including  $\theta = \pi$ , which can be related to a negative quark mass parameter. Such a phase with nonstrange and strange eta condensates was indeed identified also in the Columbia plot in the presence of the axial anomaly [2410.08185]. However, anomaly terms corresponding to different topological charge give rise to different behavior in this region. We discuss the effect of higher-order anomalous terms in an effective model framework, focusing on the emergence of CP-violating solutions and their stability. We show that, while eta condensates emerge in several scenarios, such a solution might be associated only with local minima.

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