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Understanding flavor mixing from the curvature of chiral crossover line

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Using a $(2+1)$-flavor Nambu–Jona-Lasinio (NJL) model, we study the effects of the strangeness chemical potential (μ_S) and vector interactions on the chiral crossover lines, which we then use to examine flavor mixing within this framework. With the curvature coefficients, κ_2's, showing excellent agreement with available lattice QCD (LQCD) findings, we estimate the permissible strength of various types of vector interactions. A key finding is that κ_2^B exhibits a nontrivial decreasing trend with increasing μ_S, eventually becoming negative at sufficiently high μ_S. This behavior strongly depends on flavor mixing due to the $U(1)_A$-breaking 't Hooft interaction and vector interaction. We propose this unique trend as a valuable metric for quantifying flavor mixing in both NJL-like models and QCD, advocating for further exploration of this effect in LQCD.

Author: Dr ALI, Mahammad Sabir (National Institute of Science Education and Research)

Presenter: Dr ALI, Mahammad Sabir (National Institute of Science Education and Research)

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