

## Quark-Antiquark and Diquark Condensates in Vacuum in a 2D Two-Flavor Gross-Neveu Model

ZHOU Bang-Rong

College of Physical Sciences, Graduate School of the Chinese Academy of Sciences, Beijing 100049, China

CCAST (World Laboratory), P.O. Box 8730, Beijing 100080, China

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**Abstract:** The analysis based on the renormalized effective potential indicates that, similar to in the 4D two-flavor Nambu-Jona-Lasinio (NJL) model, in a 2D two-flavor Gross-Neveu model, the interplay between the quark-antiquark and the diquark condensates in vacuum also depends on  $G_S/H_S$ , the ratio of the coupling constants in scalar quark-antiquark and scalar diquark channel. Only the pure quark-antiquark condensates exist if  $G_S/H_S > 2/3$ , which is just the ratio of the color numbers of the quarks participating in the diquark and quark-antiquark condensates. The two condensates will coexist if  $0 < G_S/H_S < 2/3$ . However, different from the 4D NJL model, the pure diquark condensates arise only at  $G_S/H_S = 0$  and are not in a possibly finite region of  $G_S/H_S$  below  $2/3$ .

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Key words: 2D Gross-Neveu model, quark-antiquark and diquark condensates, effective potential, renormalization, mean-field approximation

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