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Determination of QCD phase diagram from the imaginary chemical potential SAKAI YUJI, KASHIWA KOUJI, Kyushu University, KOUNO HIROAKI, Saga University, YAHIRO MASANOBU, Kyushu University — Lattice QCD has the well-known sign problem at real chemical potential. An approach to circumvent the problem is the analytic continuation to real chemical potential from imaginary one. We propose a new analytic continuation by using the Polyakov-loop extended Nambu–Jona-Lasinio (PNJL) model. This work is published in our papers of Phys. Rev. D77, 051901 (2008), Phys. Rev. D78, 036001 (2008), Phys. Rev. D78 076007 (2008), Phys. Rev. D 79, 076008 (2009), Phys. Rev. D 79, 096001 (2009). This talk presents the latest result of these studies. The partition function of QCD has the Roberge-Weiss (RW) periodicity in the imaginary chemical potential region. We revealed that the PNJL model has the RW periodicity. Strength parameters of the vector-type four-quark and scalar-type eight- quark interactions are determined so as to reproduce lattice data on pseudocritical temperatures of the deconfinement and chiral phase transitions in the imaginary chemical potential region. The QCD phase diagram in the real chemical potential region is predicted by the PNJL model. The critical endpoint survives, even if the vector-type four-quark interaction is taken into account.

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