

The QCD phase diagram from imaginary chemical potential

Philippe de Forcrand
ETH Zürich & CERN & YITP

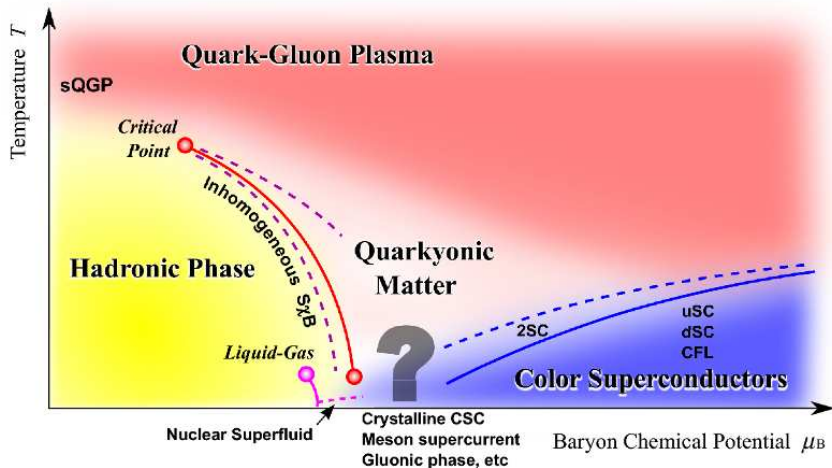
with Massimo D'Elia, Claudio Bonati, Francesco Sanfilippo
and Owe Philipsen

arXiv:1201.2769 – YITP-12-2

ETH

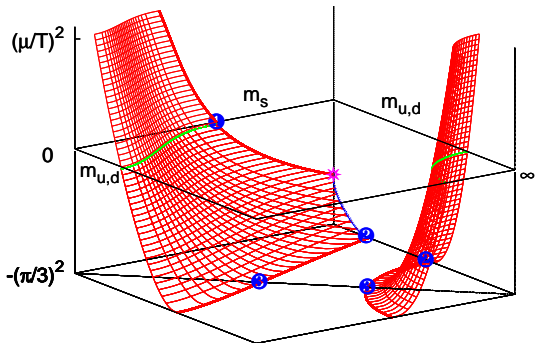
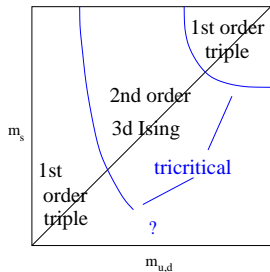
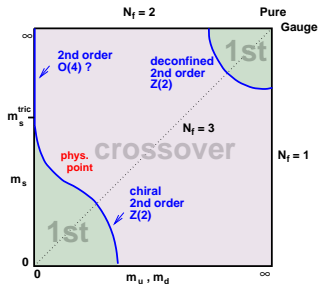
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

The phase diagram of QCD ?



$\mu \neq 0$: lattice QCD blocked by complex determinant
Learn as much as possible from **imaginary μ**

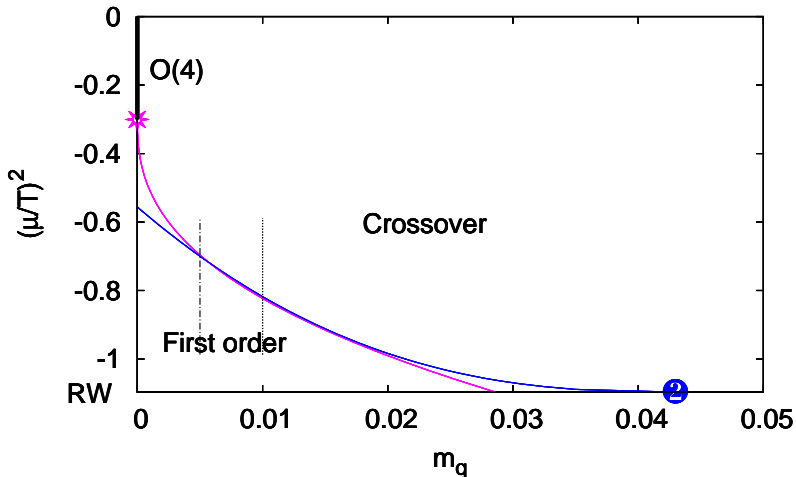
Put Columbia plots at $\mu/T = 0$ and $\mu/T = i\pi/3$ together



- Red surfaces are critical
 - Thick lines are tricritical \rightarrow scaling
- Focus on blue $N_f = 2$ line

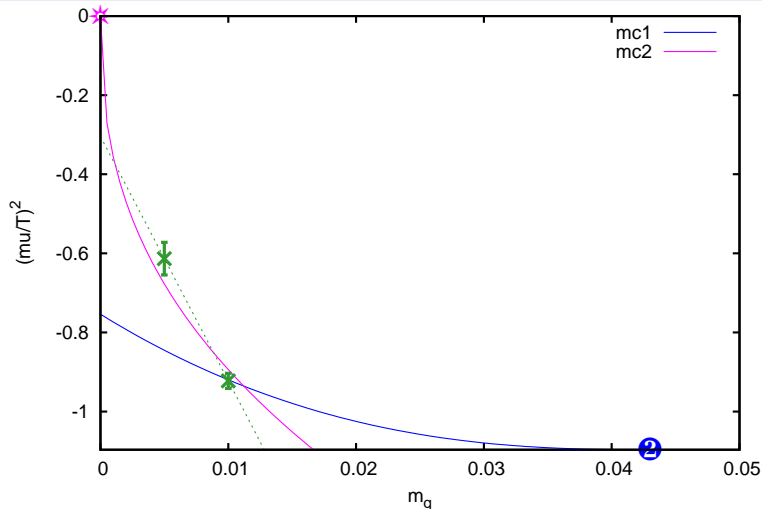
$N_f = 2$ backplane: constrained phase diagram

Matching tricritical scaling around μ_{RW} and around $m=0$



Two tricritical points joined by a critical (Ising) line
One tricritical point known – **where is the other?**

$N_f = 2$ backplane: constrained phase diagram



Two tricritical points joined by a critical (Ising) line
One tricritical point known – **where is the other?**