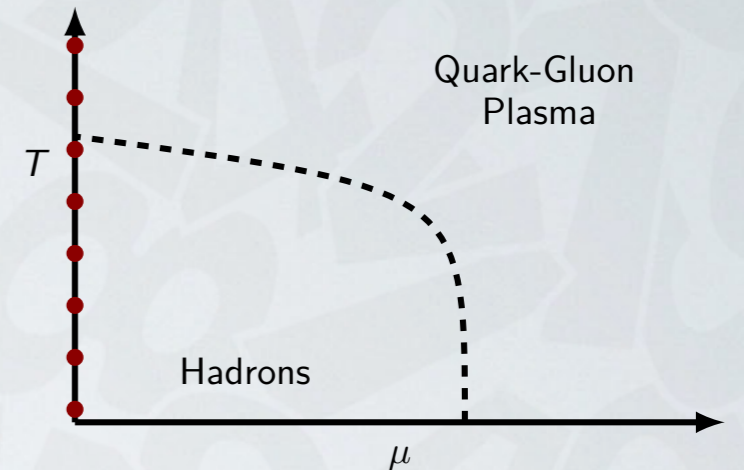
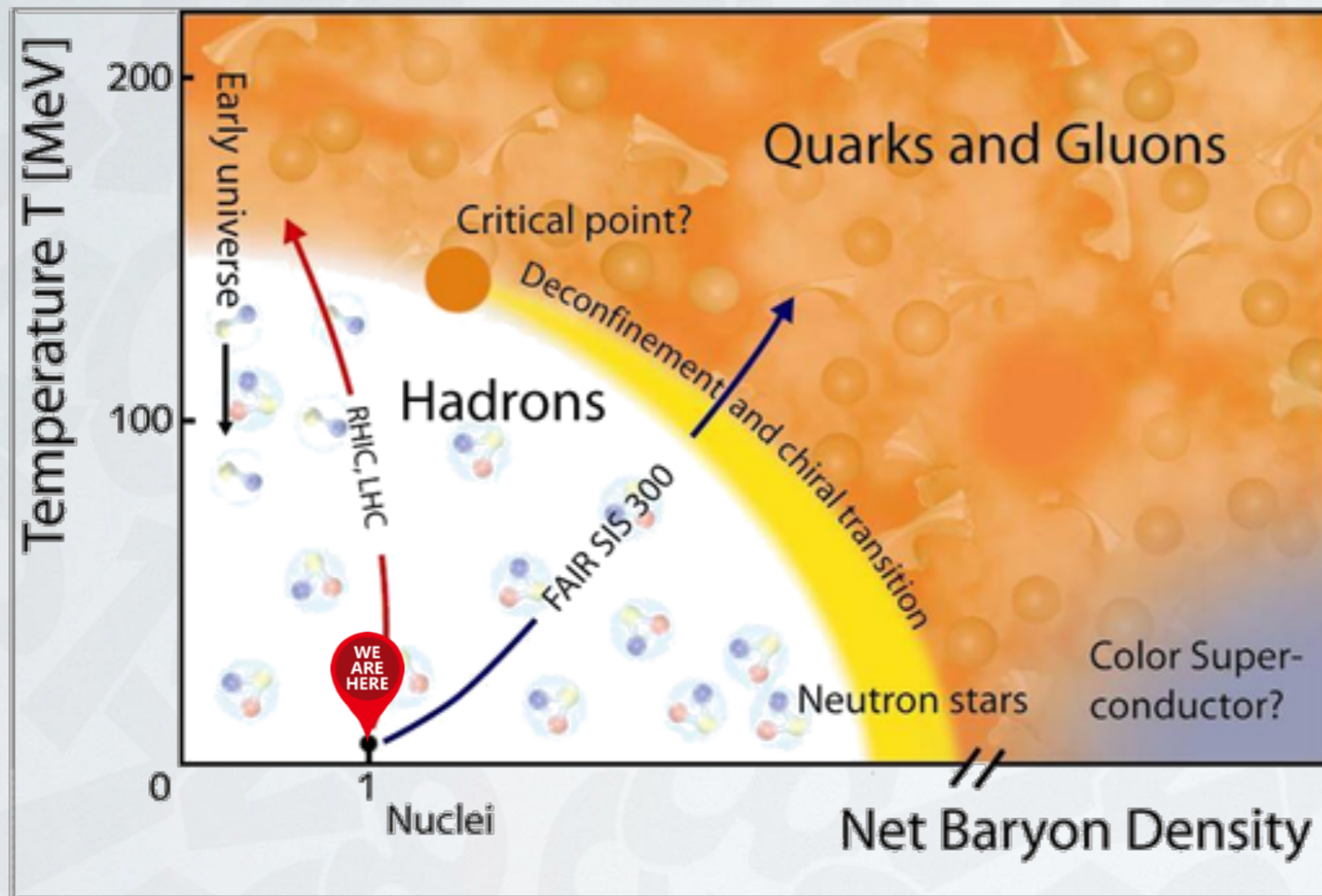
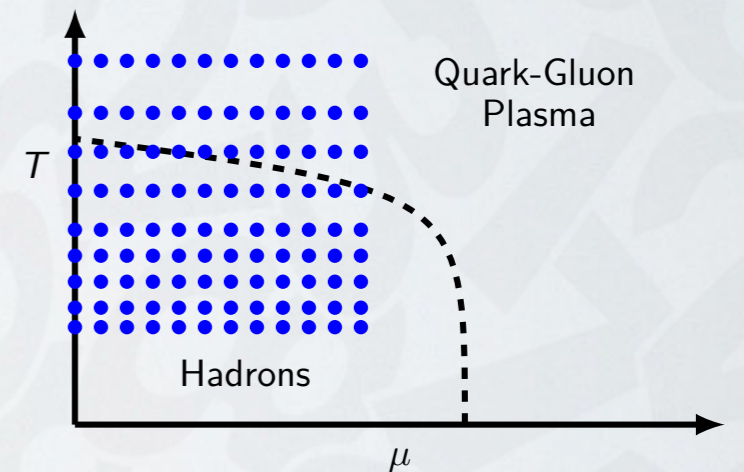


What are we looking for?



Direct Lattice simulation

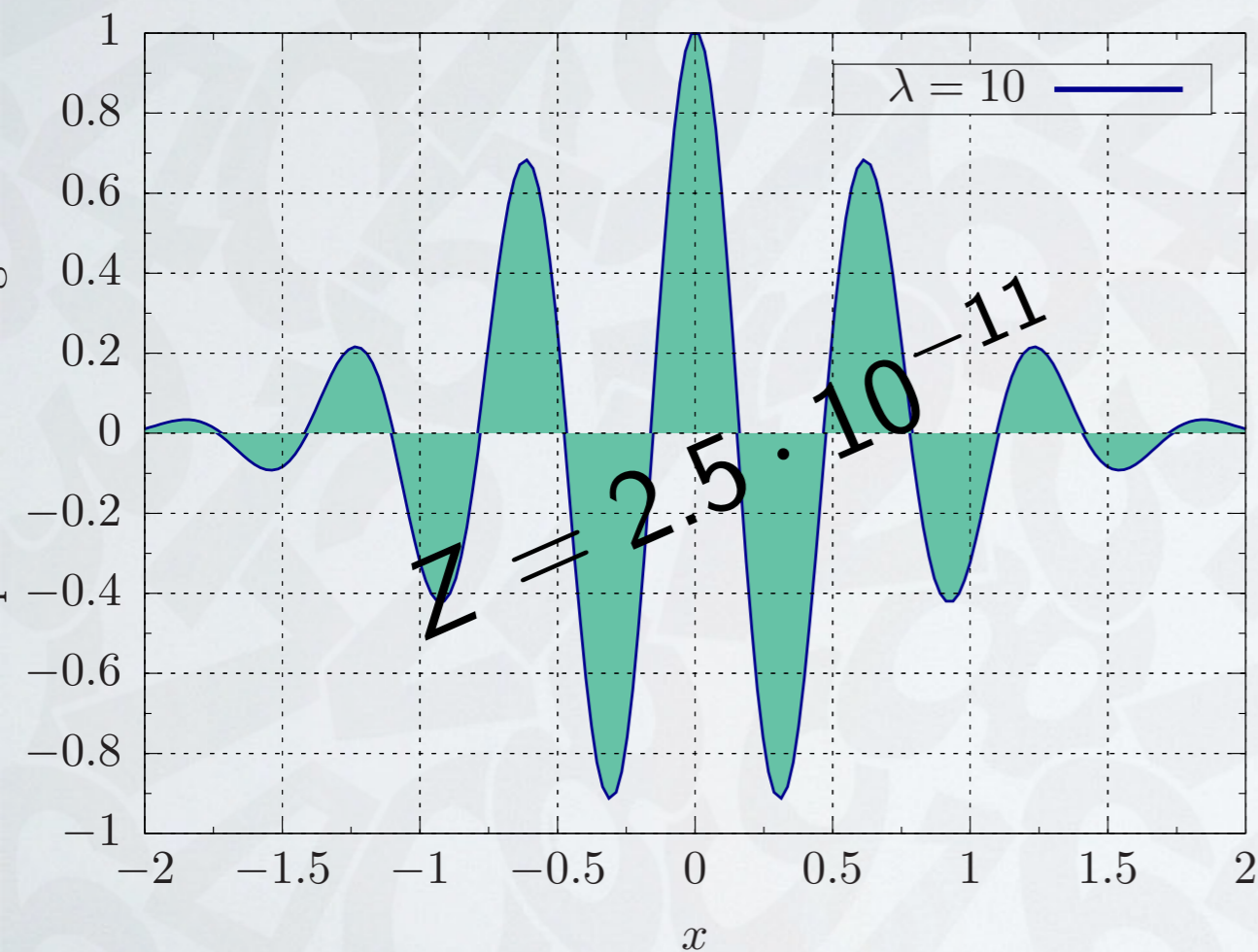


Complex Langevin

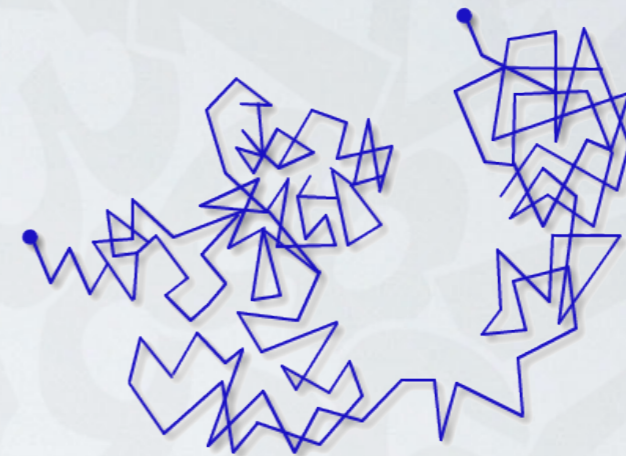
Sign Problem

Sign Problem

$$Z = \int dx e^{-x^2 + i\lambda x}$$



Complex Langevin



Complexify

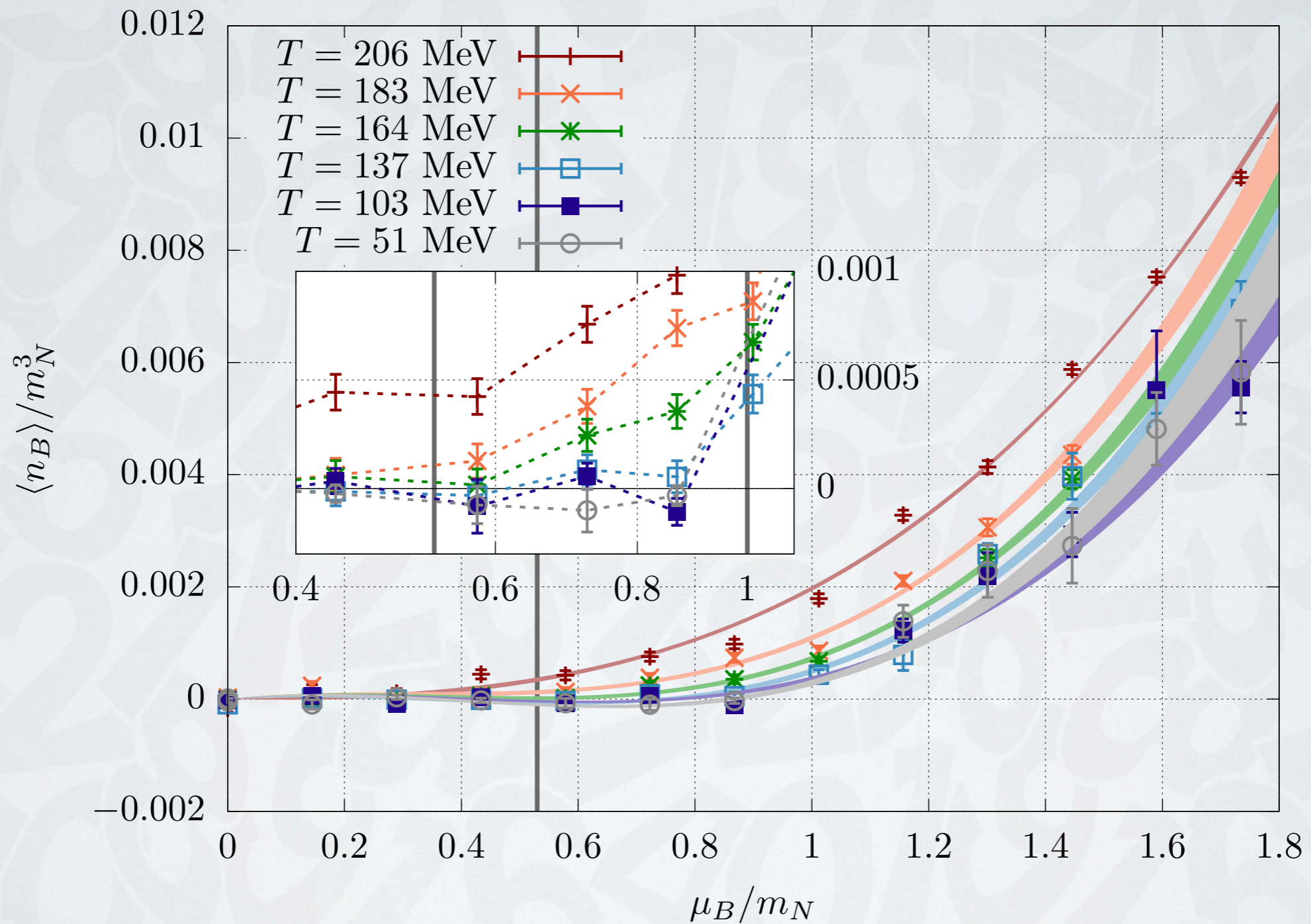
$$x \rightarrow z = x + iy$$

$$SU(3) \rightarrow SL(3, \mathbb{C})$$

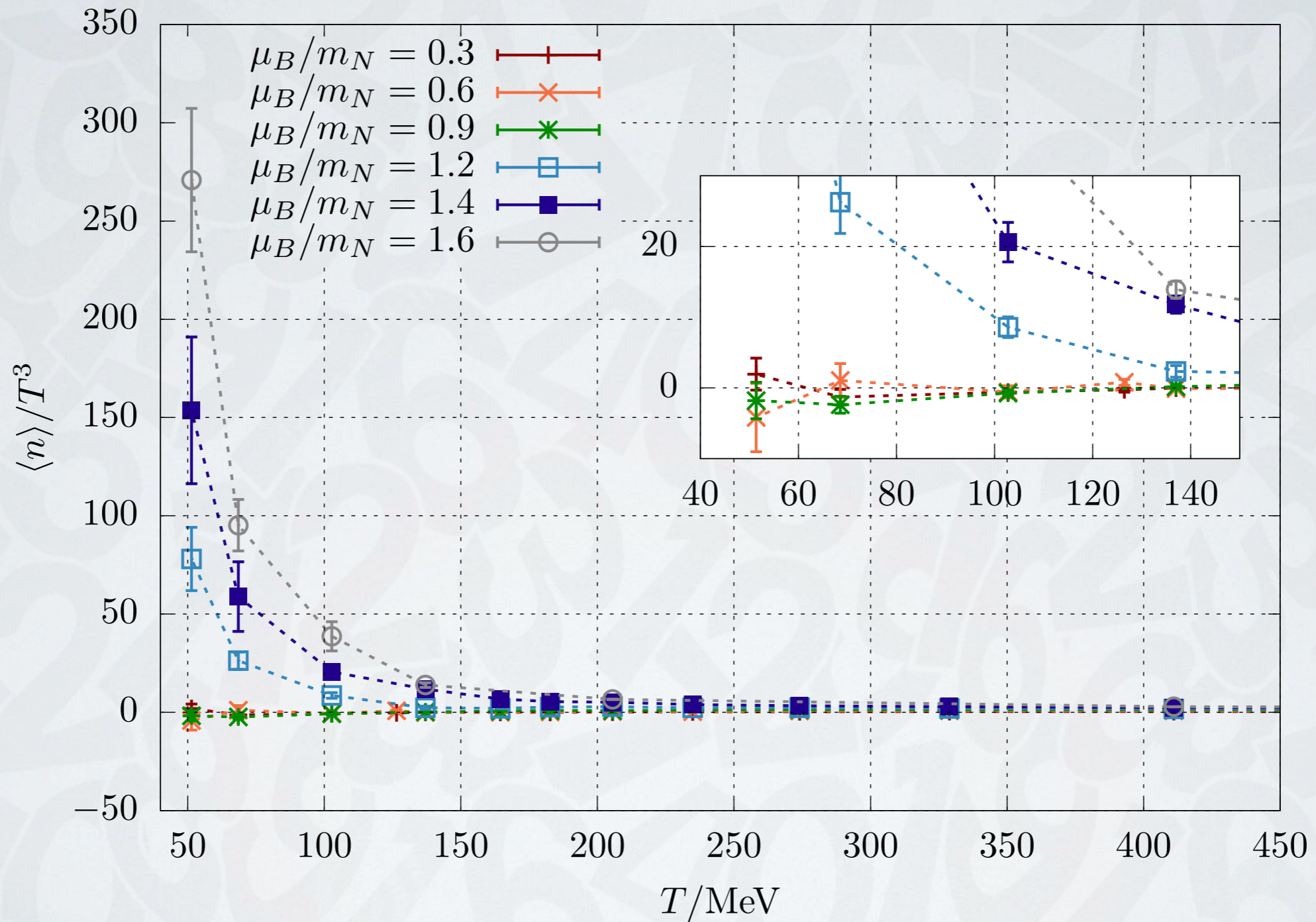
Langevin Eq

$$\frac{\partial z}{\partial \theta} = \frac{\partial S}{\partial z} + \eta(\theta)$$

Results for Wilson @ 500 MeV



Results for Wilson @ 500 MeV



What next?

Current setup

- Wilson plaquette action
- Pion mass $m_\pi \sim 500$ MeV
- Two flavour $N_f = 2$
- Volume $V = 24^3$
- Naive Wilson $c_{sw} = 0$

- Temp. $T = 25 - 800$ MeV
- Dens. $\mu = 0 - 6.5$ GeV
- Strange dens. $\mu_s = 0$

Future

- Wilson plaquette action
- Pion mass $m_\pi \rightarrow m_\pi^{phys.}$
- Two flavour $N_f = 2 + 1$
- Volume $V = 32^3$
- Wilson clover $c_{sw} \neq 0$

- Temp. $T = 12 - 400$ MeV
- Dens. $\mu = 0 - 6.5$ GeV
- Strange dens. $\mu_s \neq 0$