Measurement of latent heat of deconfinement transition in SU(3) Yang-Mills theory

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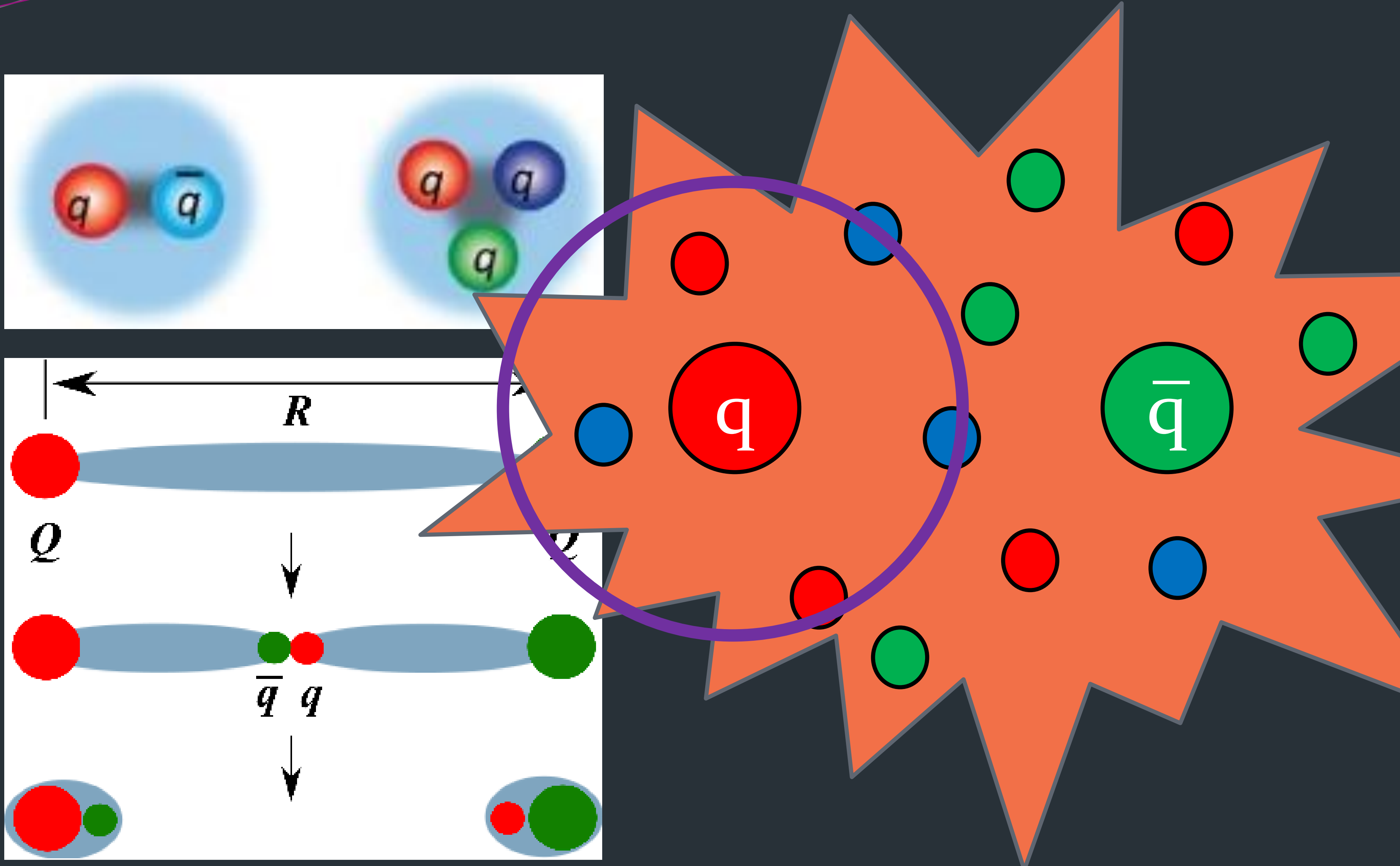
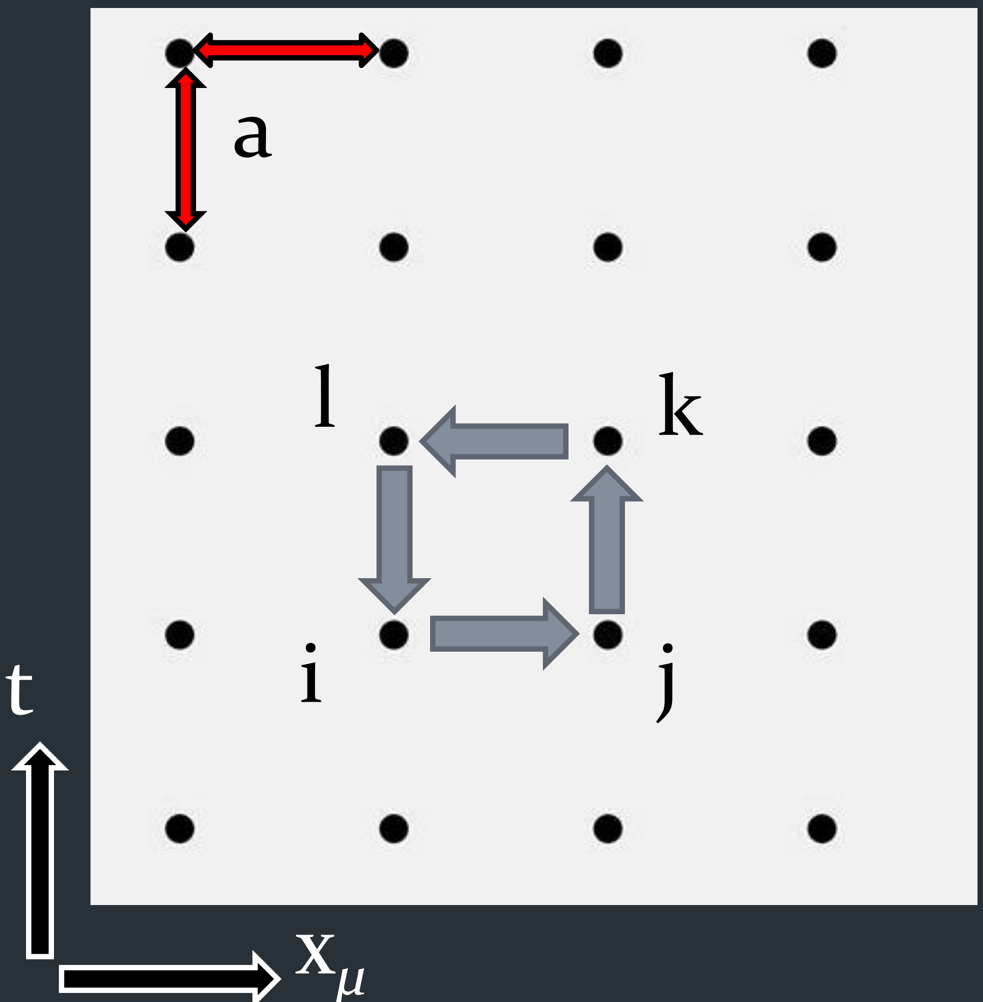


T_c~170MeV

Lattice Gauge Theory



$$U_{ij} \in SU(3)$$

$$\Box = U_{ij}U_{jk}U_{kl}U_{li}$$

$$S_{\Box} = \beta\left(1 - \frac{1}{N} Re\, Tr \Box\right)$$

$$\beta = \frac{2N}{g^2{}_0}$$

$$L_\mu = a \cdot n_\mu$$

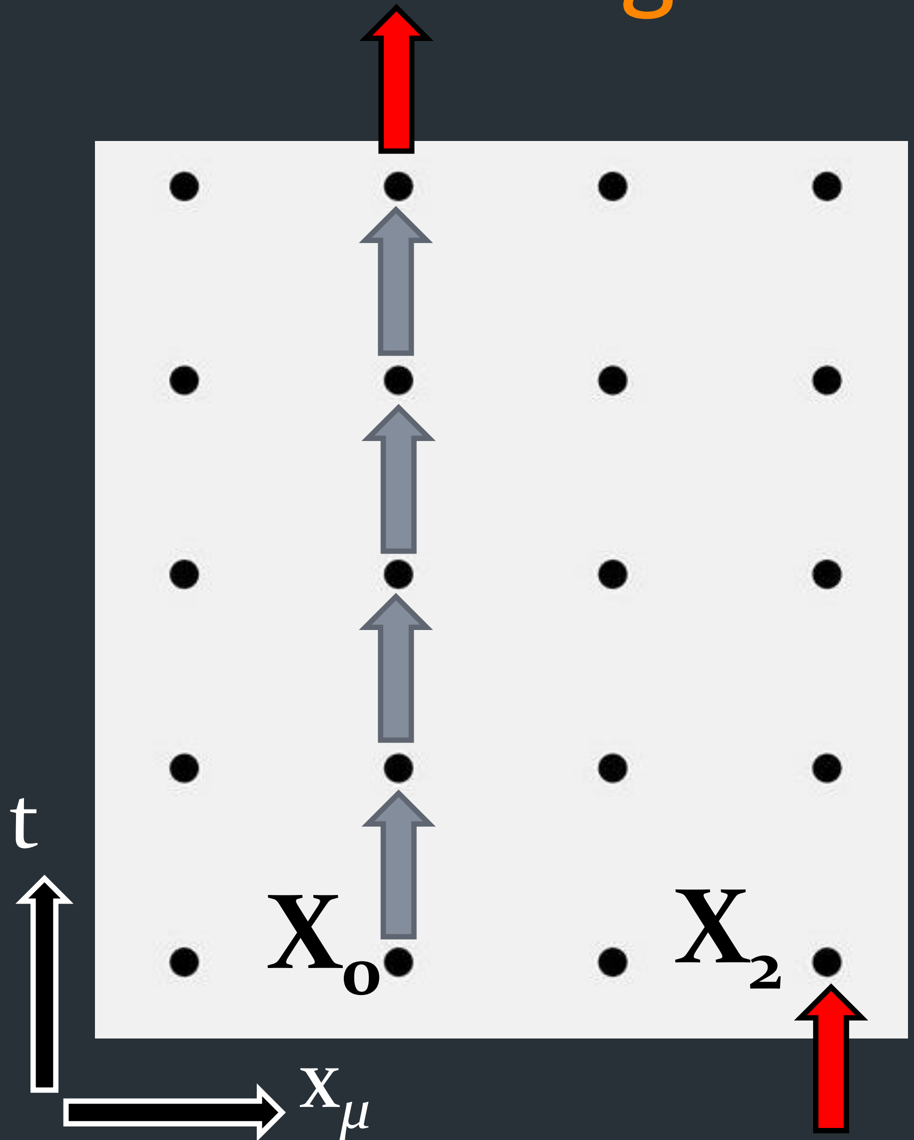
$$dP \sim e^{-S}$$

$$L_s{}^3;\ L_t$$

Our Work

- Pure gauge theory
- First order phase transition
- Latent heat
- We measured the latent heat, using entropy density
- Moving frame

Lattice Gauge Theory



Energy-momentum Tensor

$$T_{\mu\nu}=\frac{\beta}{2N}(F_{\mu\alpha}F_{\nu\alpha}-\frac{\delta_{\mu\nu}}{4}F_{\alpha\beta}F_{\alpha\beta})$$

Temperature

$$T^{-1} = a \cdot L_t \sqrt{1+\xi^2}$$

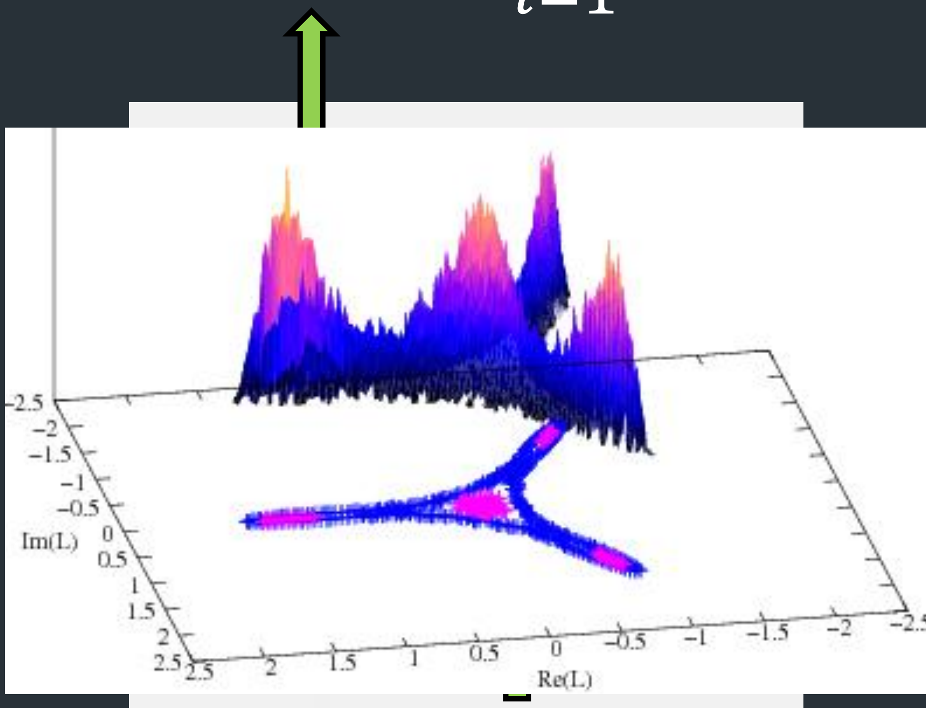
Entropy Density

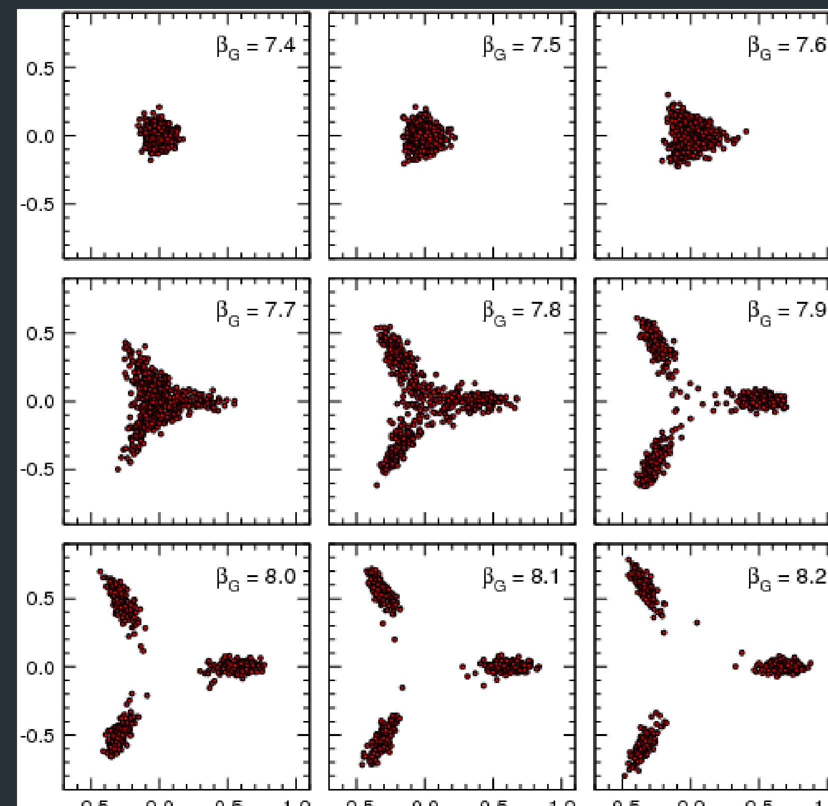
$$\frac{s}{T^3} = -(1+\xi^2)\frac{\langle T_{0k}\rangle_\xi Z_t}{T^4}$$

Polyakov Loop

$$S = \frac{3\omega_c - \omega_d}{3\omega_c + \omega_d}$$

$$\langle P \rangle = Tr\left(\prod_{i=1}^{T} U_4\right)$$





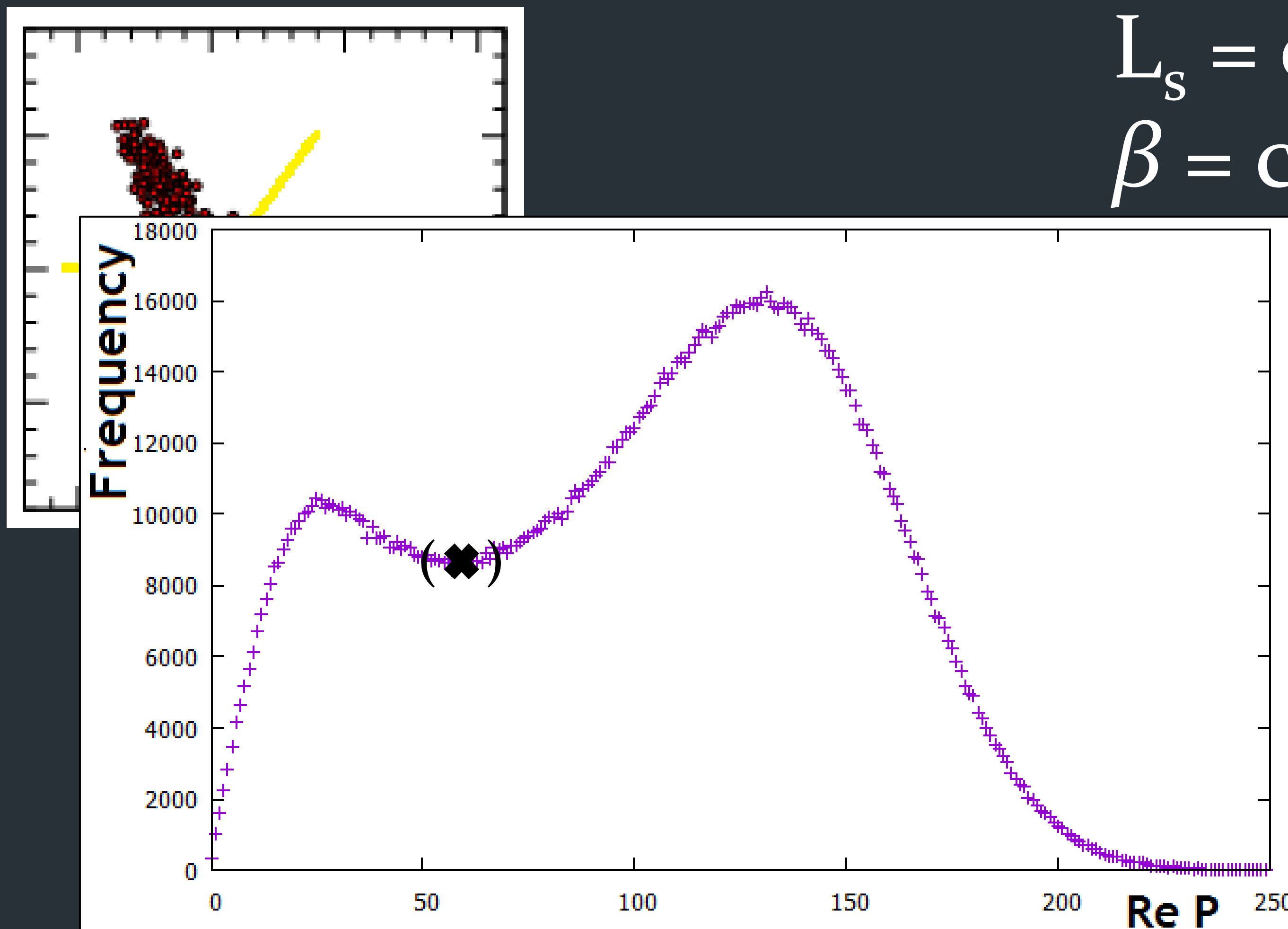
From β to S

L_t = const

L_s = const

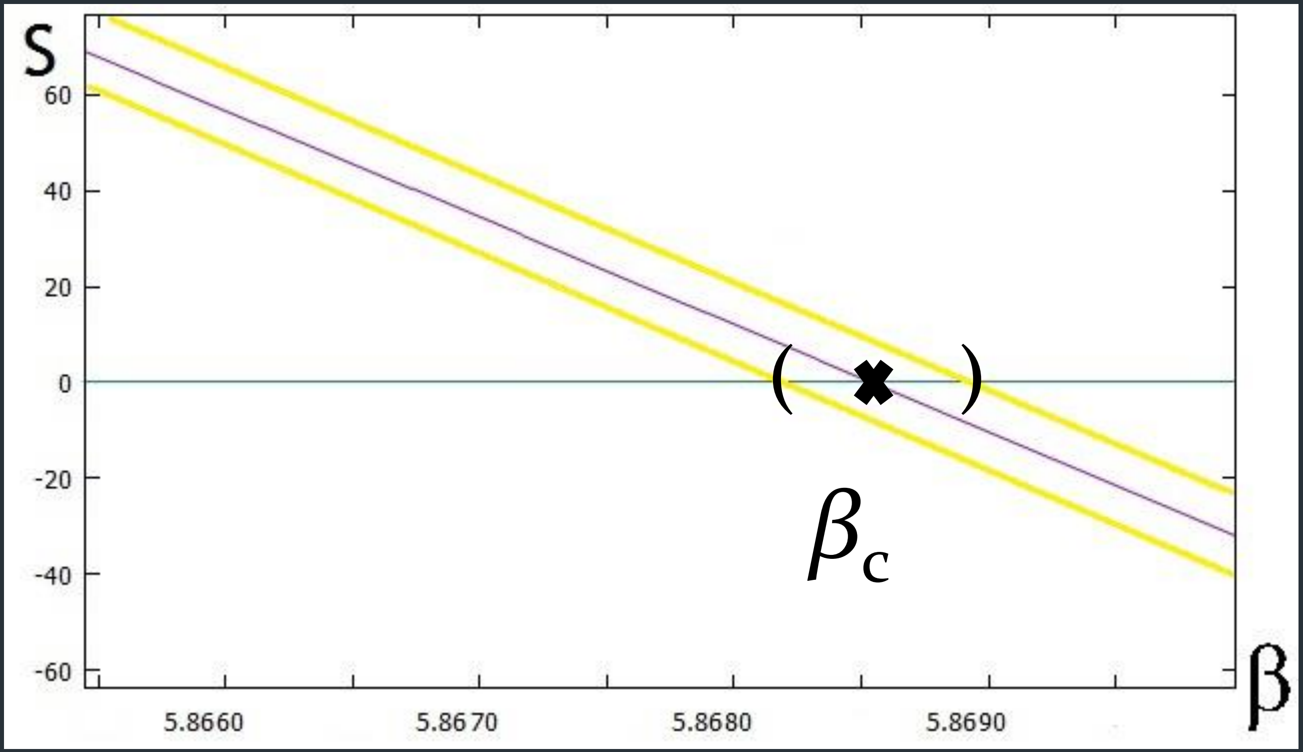
β = const

= const

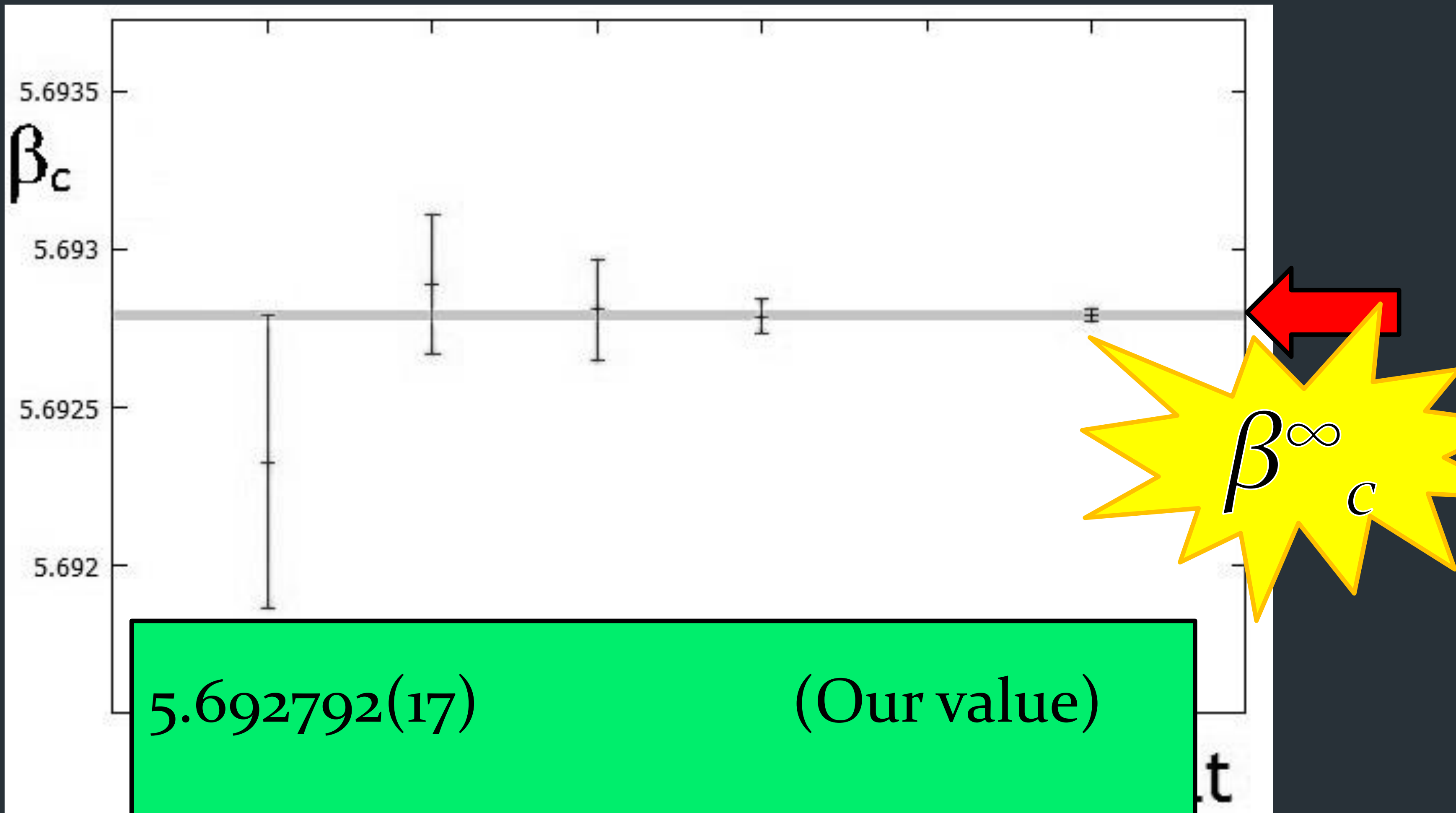


From S to β *critical*

L_t = const
L_s = const
Shift = const



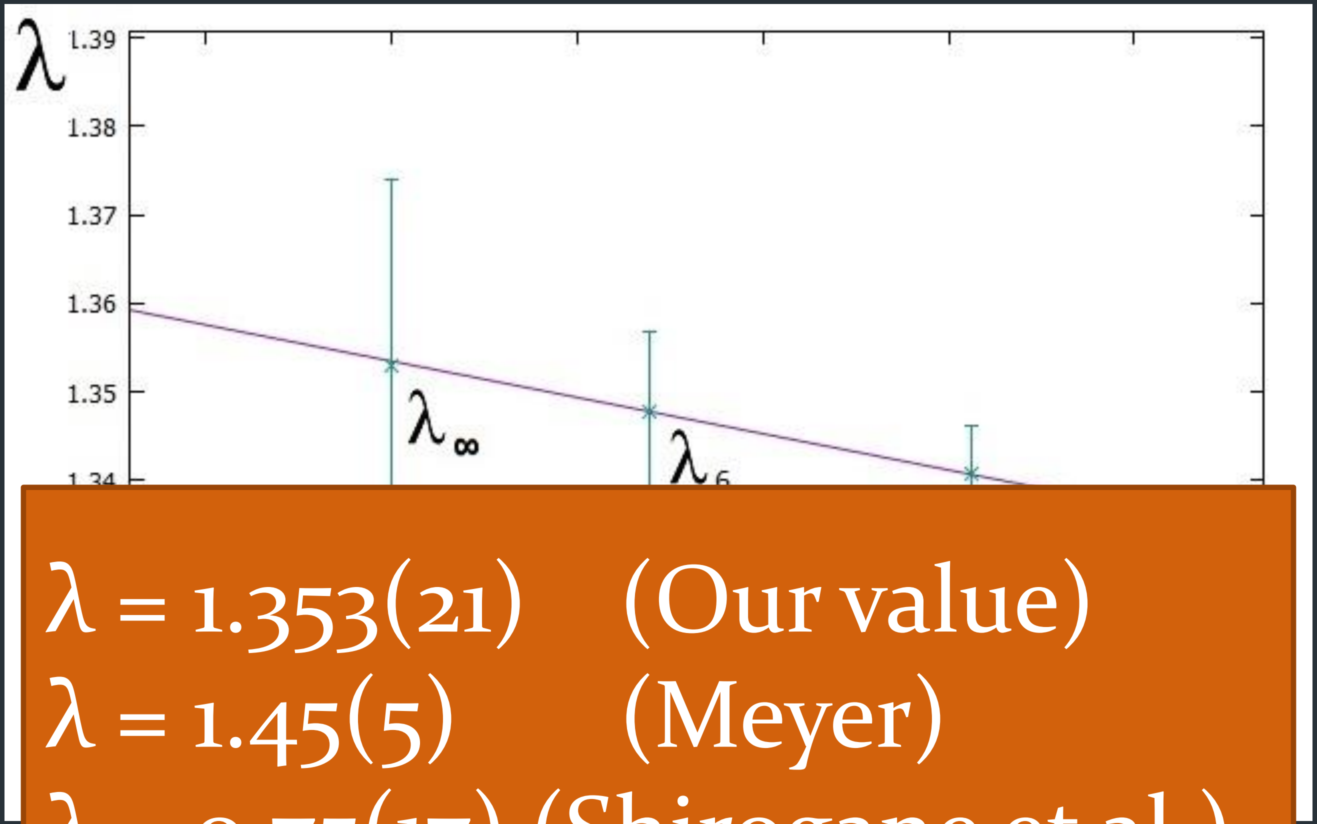
$L_t = 4$
Shift = 0



5.692792(17)	(Our value)
5.69275(28)	(Francis et al.)

$L_t = 4$
Shift = 4

$L_t = 6$
Shift = 6



$\lambda = 1.353(21)$ (Our value)
$\lambda = 1.45(5)$ (Meyer)
$\lambda = 0.75(17)$ (Shirogane et al.)