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September 9, 2021

High precision results

The following results were obtained through several simulations on lattices of size 6×64 , 7×64 , 8×64 , 9×64 , 10×64 , 11×64 and 12×64 with the parameters shown in Table 1

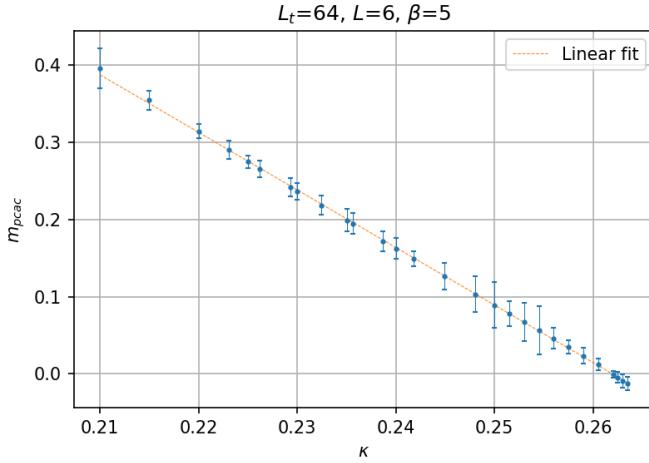
Ntime	64
Ntherm	1000
Nmeasure	10000
Trajectory Steps	10
Nsteps	200
β	5

Table 1: All the simulations were performed with this parameters.

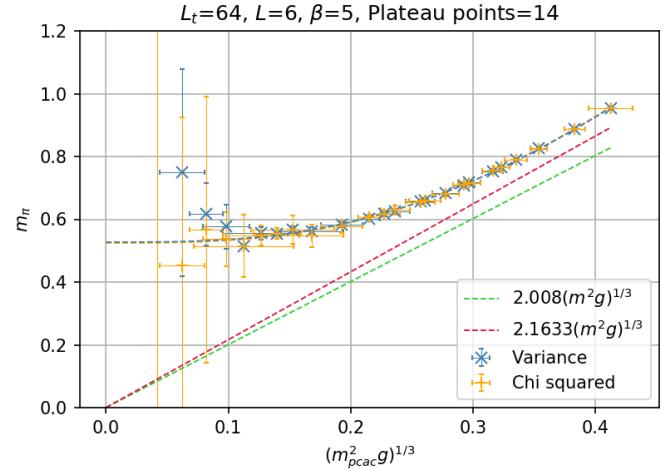
Variance stands for the var option in the masscoll program and Chi squared for the χ^2 option. $g = \frac{1}{\sqrt{\beta}} = \frac{1}{2}$. The residual pion mass is extrapolated with two different methods. In the plots of m_π vs. $(gm_{pcac}^2)^{1/3}$ we fit a function of the form

$$y = \sqrt{a + bx^3}. \quad (1)$$

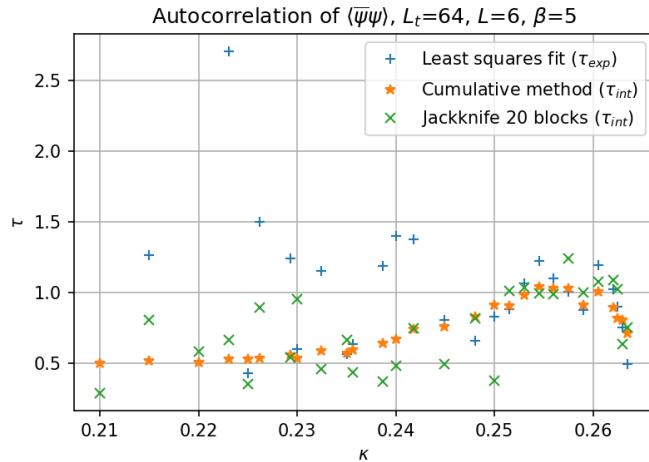
6x64



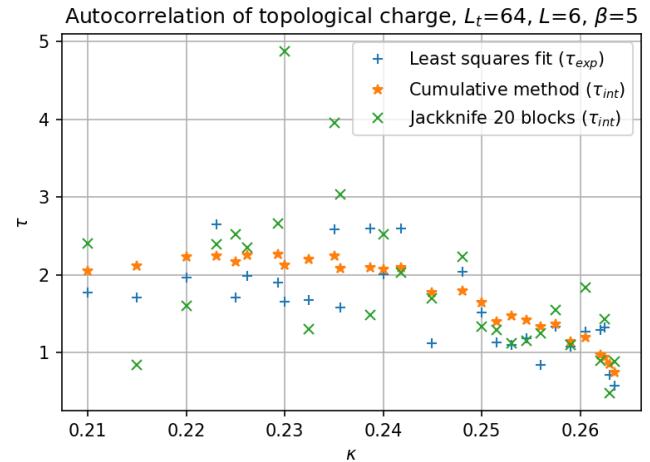
(a) Fermion mass using PCAC relation.



(b) A function of the form $y = \sqrt{a + bx^3}$ was fitted. Only $m_{pcac} > 0$ is considered.



(c) Autocorrelation of $\langle\bar{\psi}\psi\rangle$



(d) Autocorrelation of the topological charge

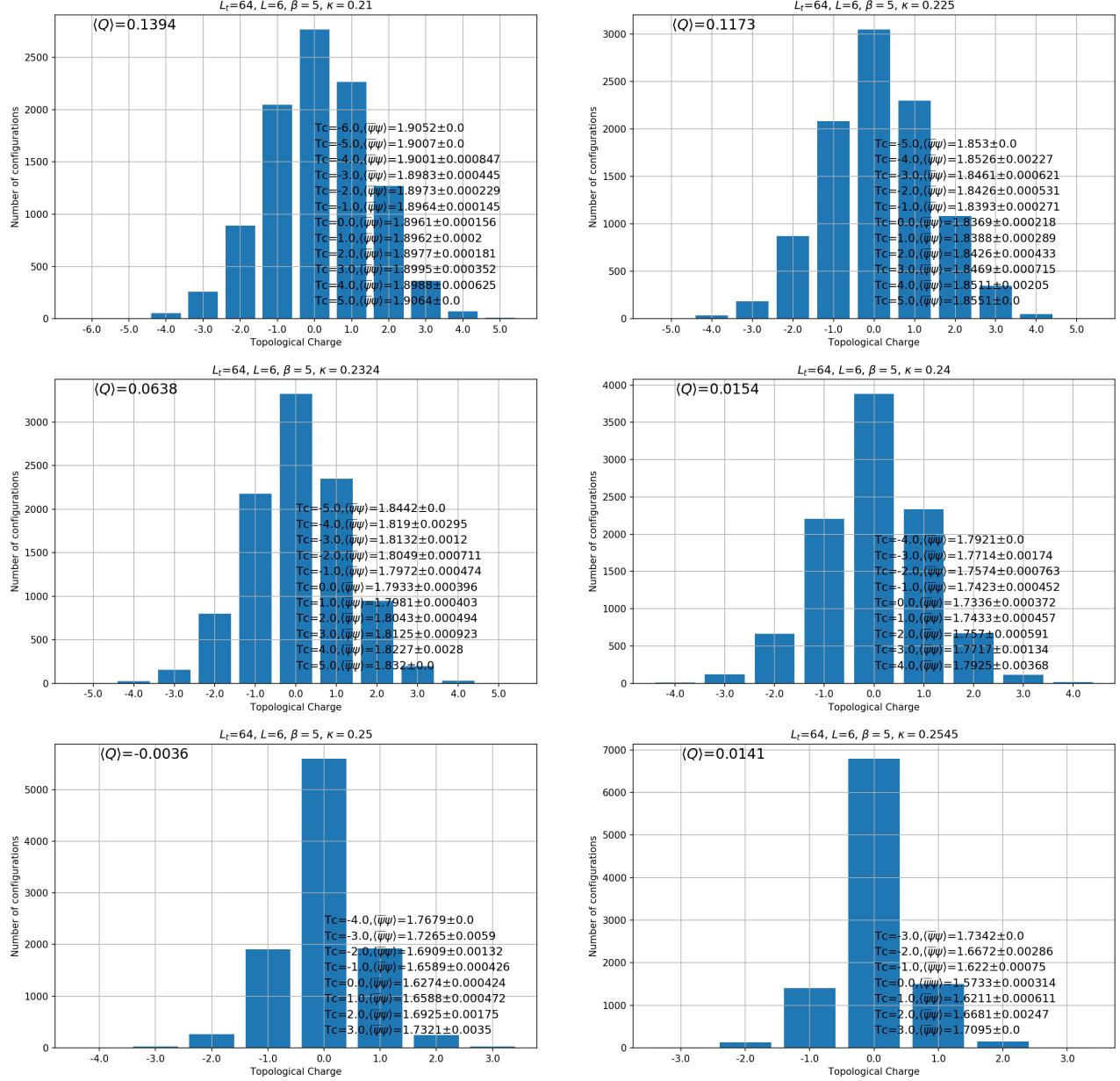
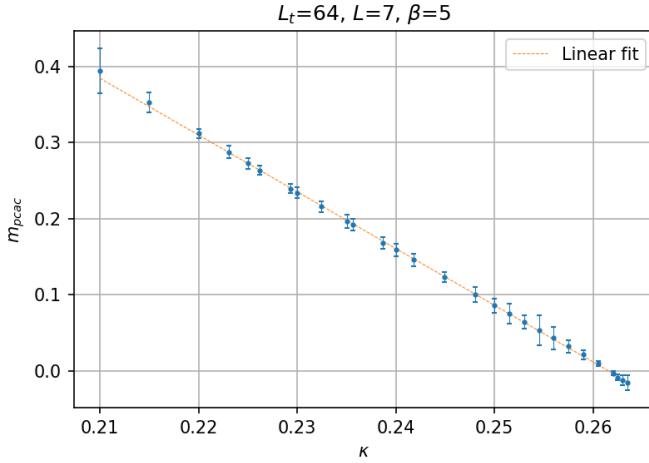
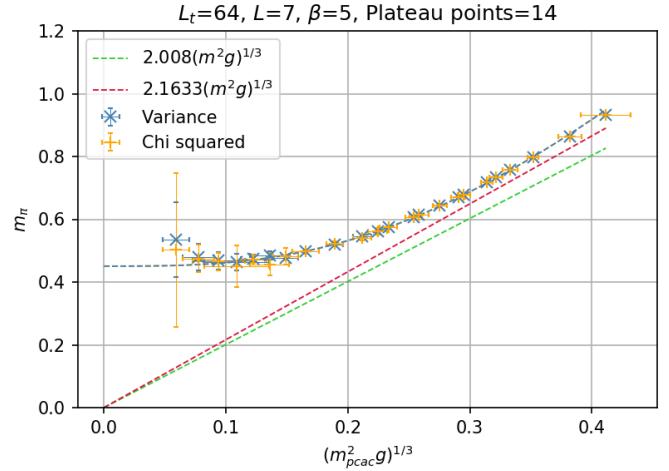


Figure 1: Number of configurations vs. topological charge on a 6×64 lattice.

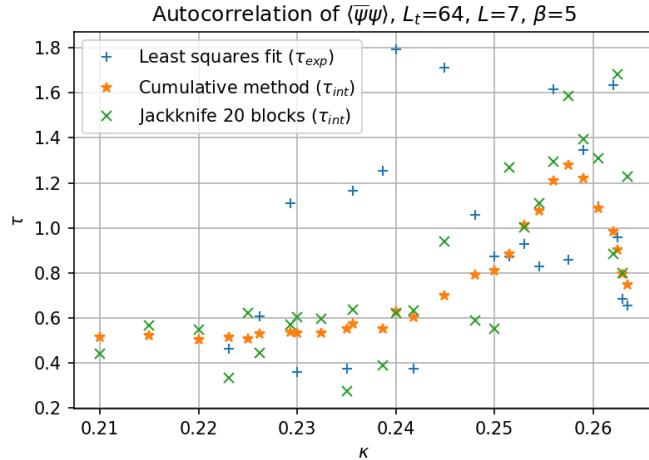
7x64



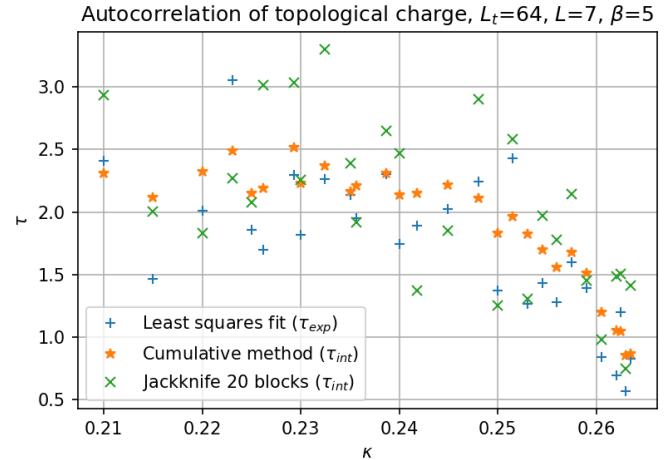
(a) Fermion mass using PCAC relation.



(b) A function of the form $y = \sqrt{a + bx^3}$ was fitted. Only $m_{pcac} > 0$ is considered.



(c) Autocorrelation of $\langle\bar{\psi}\psi\rangle$



(d) Autocorrelation of the topological charge

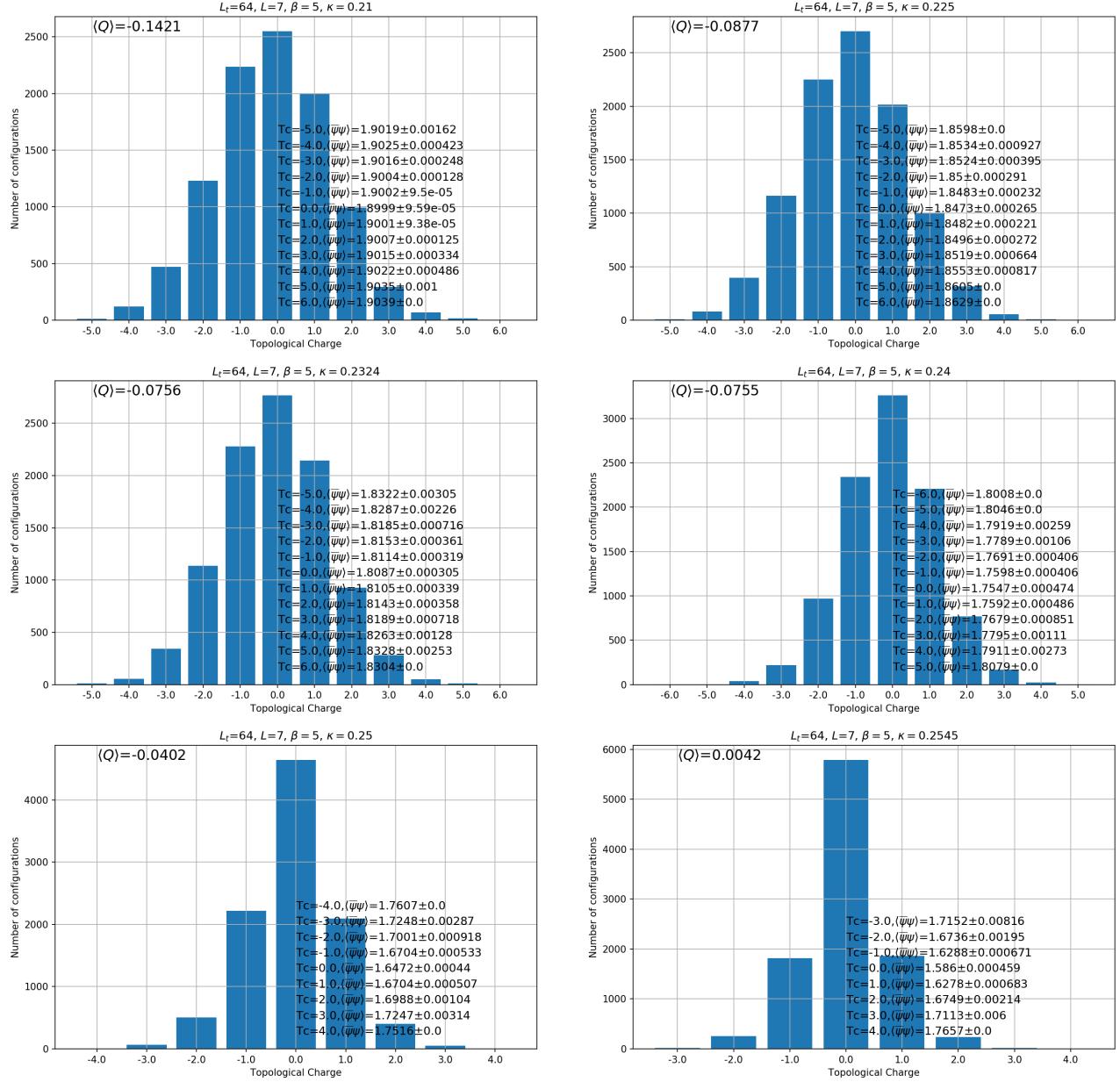
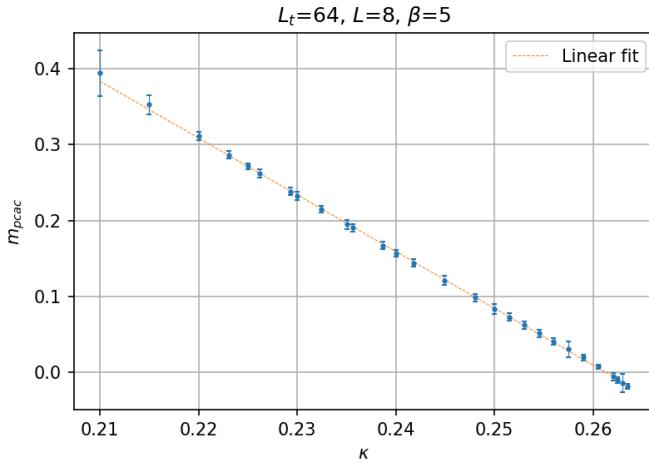
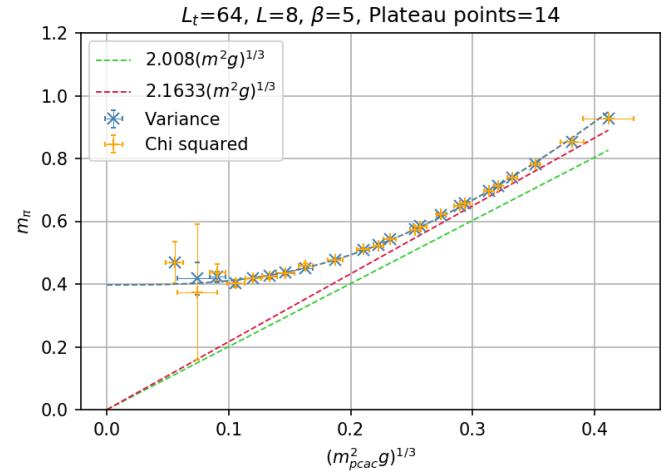


Figure 2: Number of configurations vs. topological charge on a 7×64 lattice.

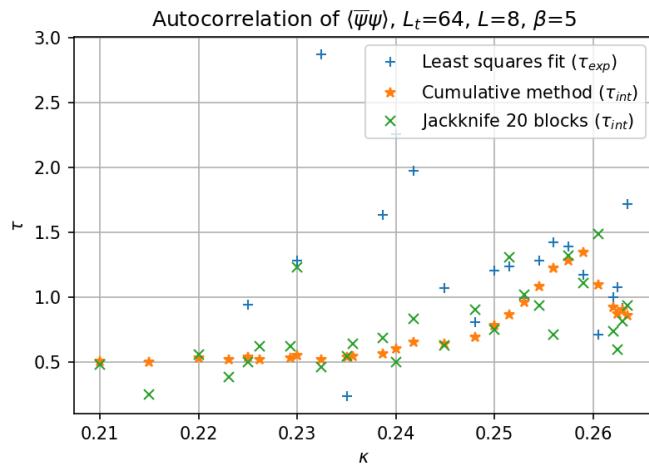
8x64



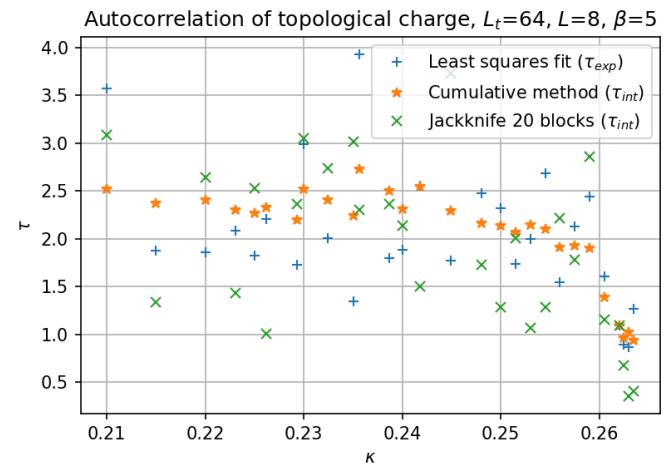
(a) Fermion mass using PCAC relation.



(b) A function of the form $y = \sqrt{a + bx^3}$ was fitted. Only $m_{pcac} > 0$ is considered.



(c) Autocorrelation of $\langle\bar{\psi}\psi\rangle$



(d) Autocorrelation of the topological charge

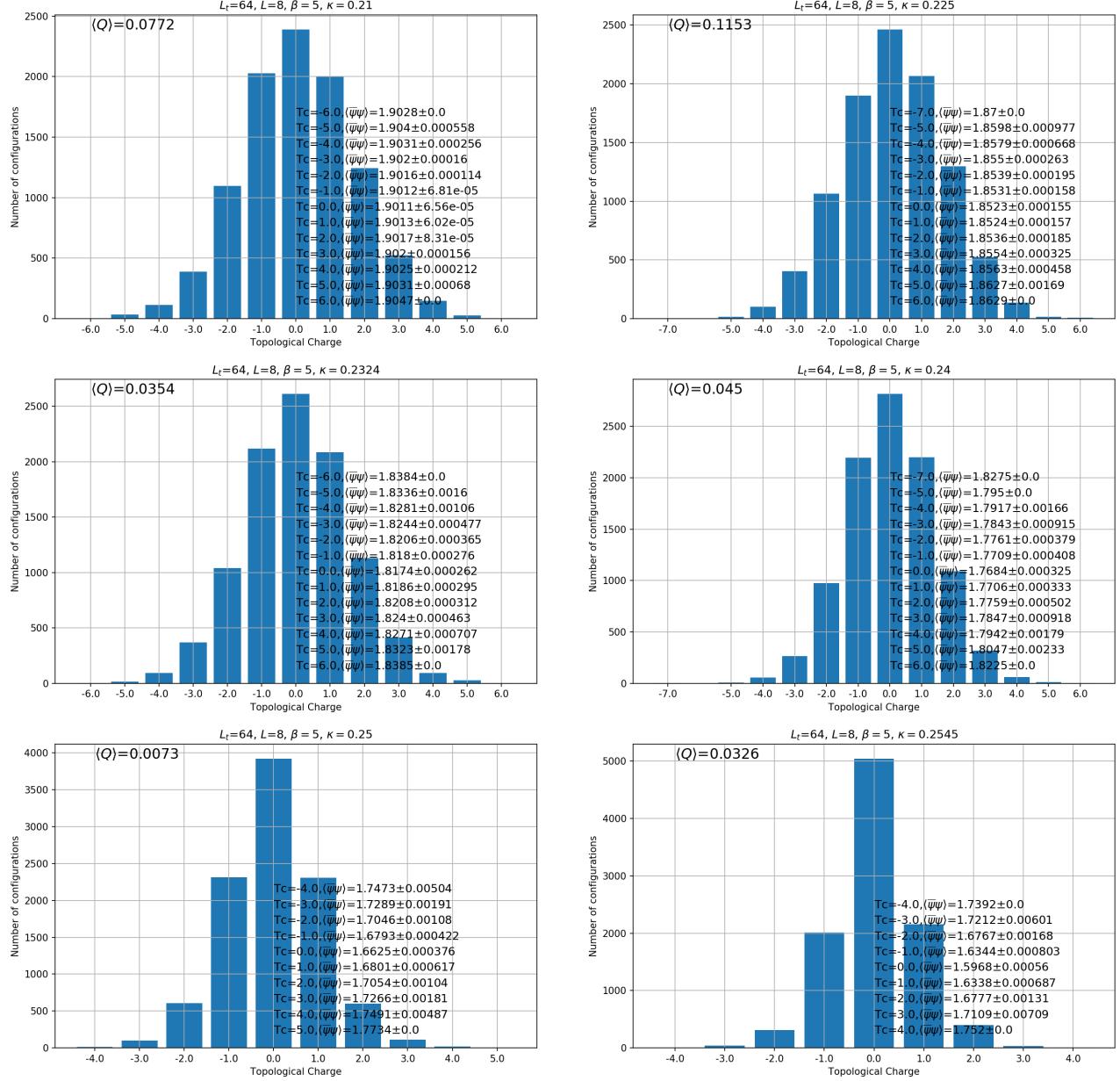
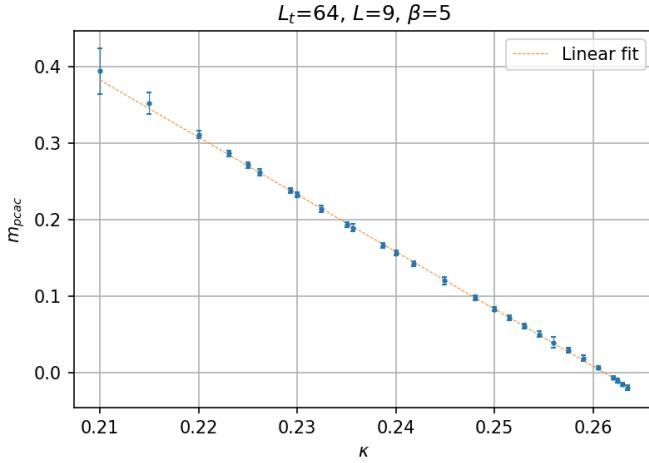
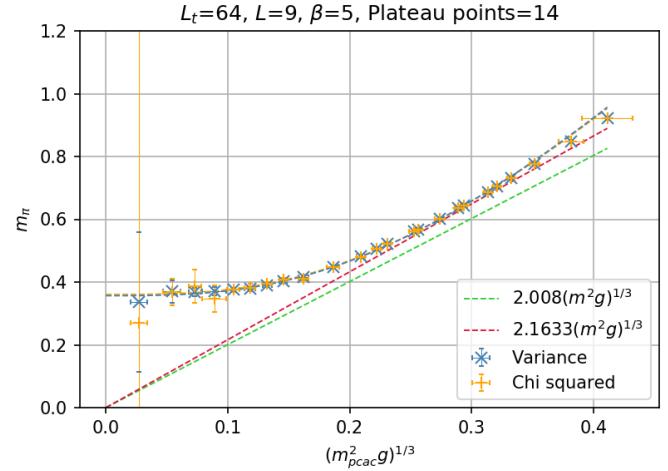


Figure 3: Number of configurations vs. topological charge on a 8×64 lattice.

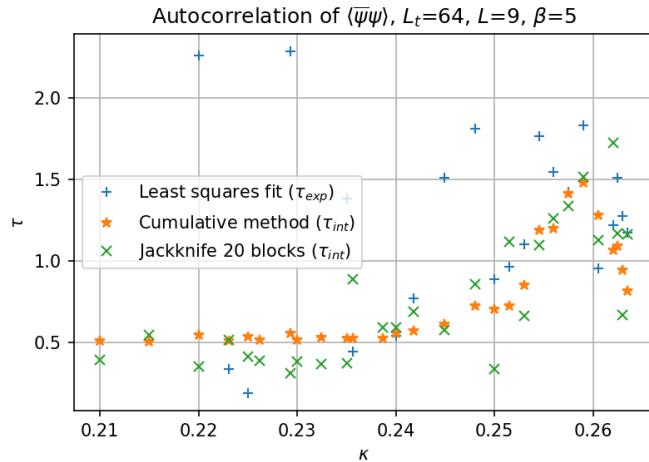
9x64



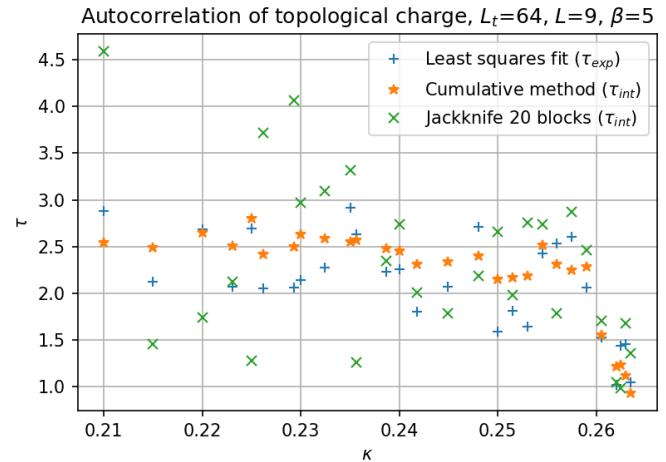
(a) Fermion mass using PCAC relation.



(b) A function of the form $y = \sqrt{a + bx^3}$ was fitted. Only $m_{pcac} > 0$ is considered.



(c) Autocorrelation of $\langle\bar{\psi}\psi\rangle$



(d) Autocorrelation of the topological charge

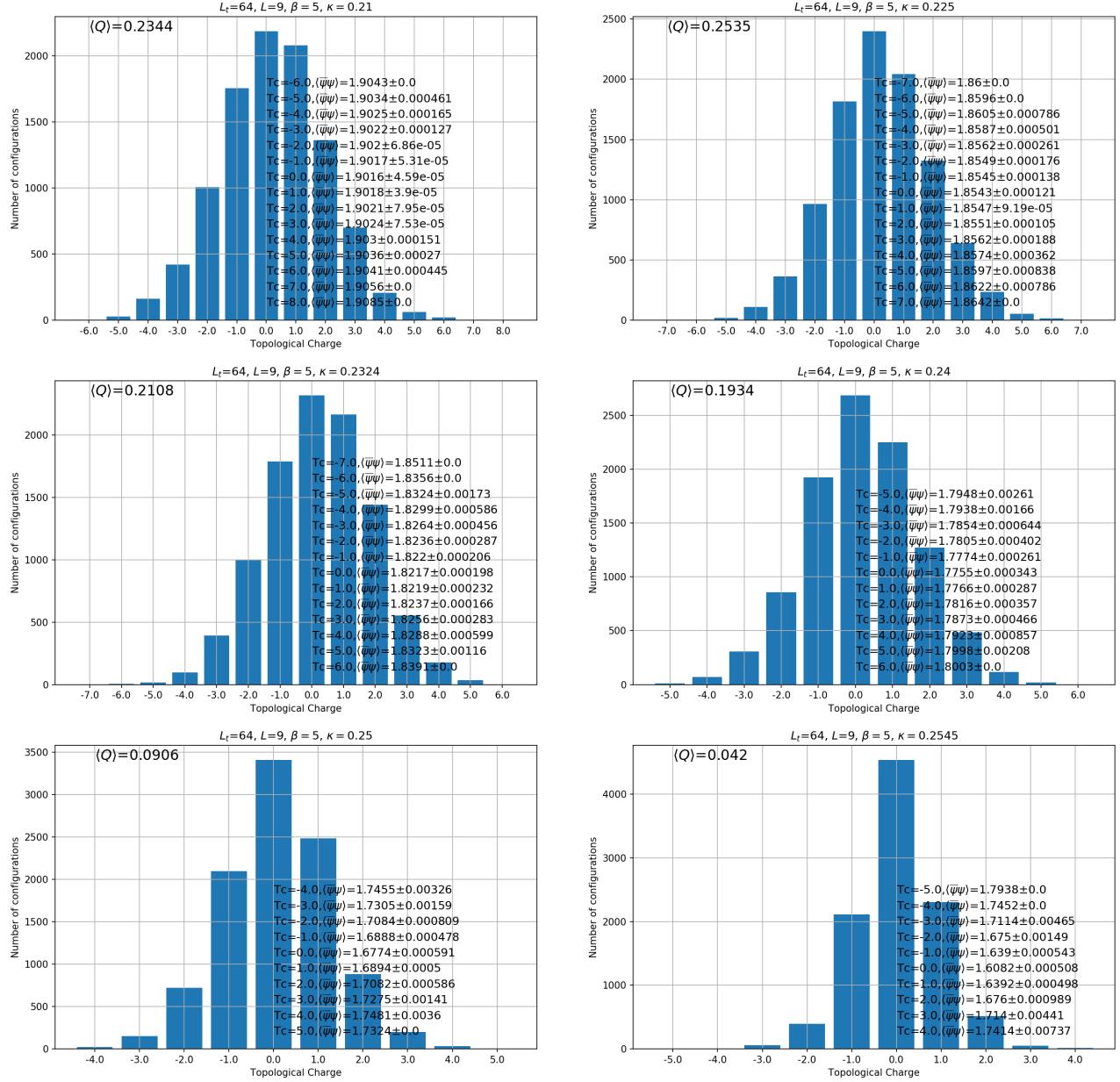
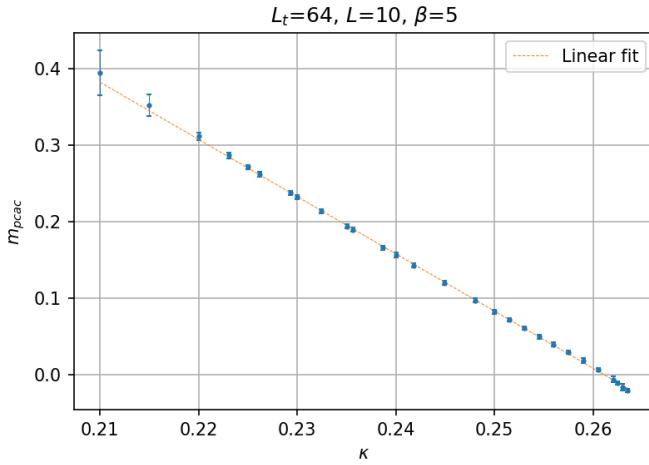
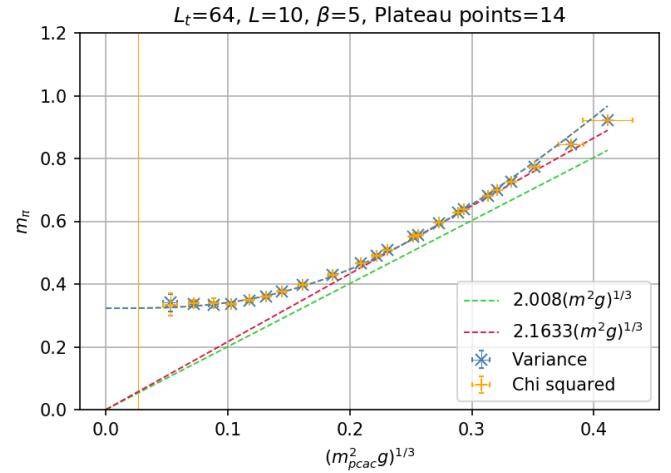


Figure 4: Number of configurations vs. topological charge on a 9×64 lattice.

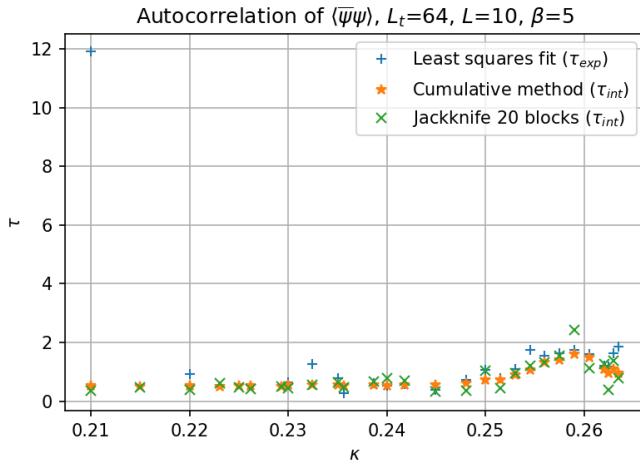
10x64



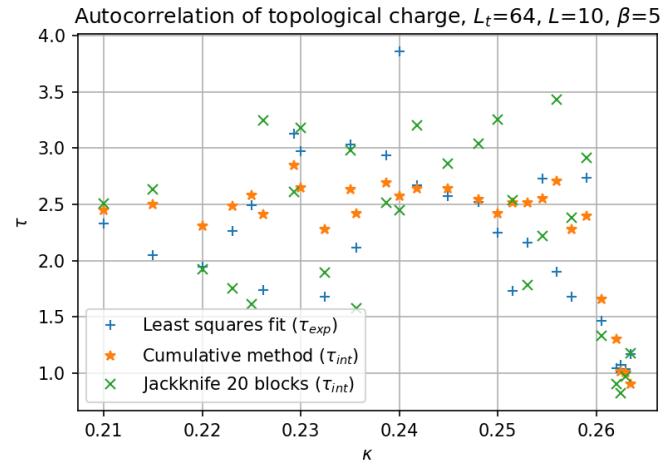
(a) Fermion mass using PCAC relation.



(b) A function of the form $y = \sqrt{a + bx^3}$ was fitted. Only $m_{pcac} > 0$ is considered.



(c) Autocorrelation of $\langle\bar{\psi}\psi\rangle$



(d) Autocorrelation of the topological charge

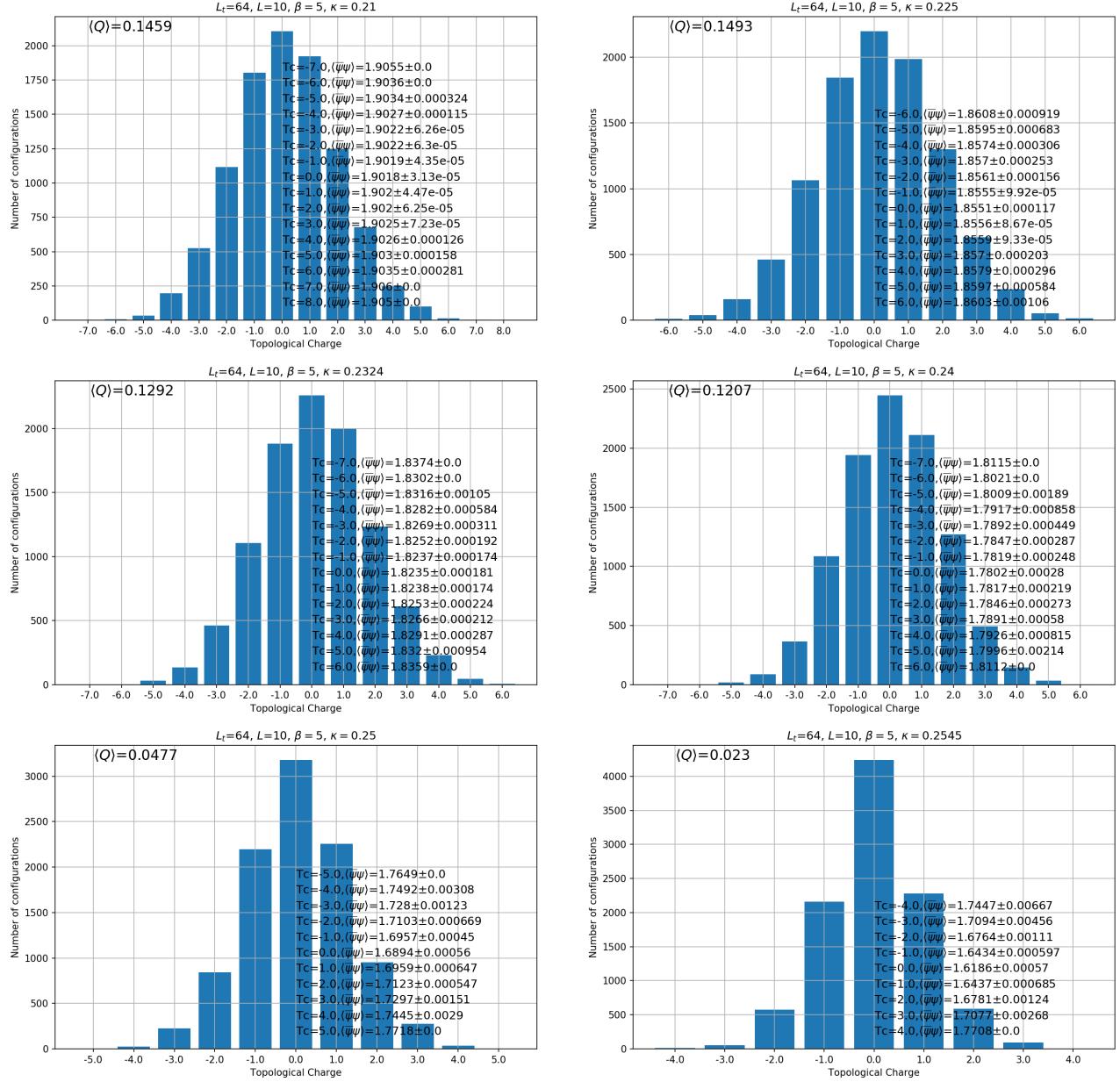
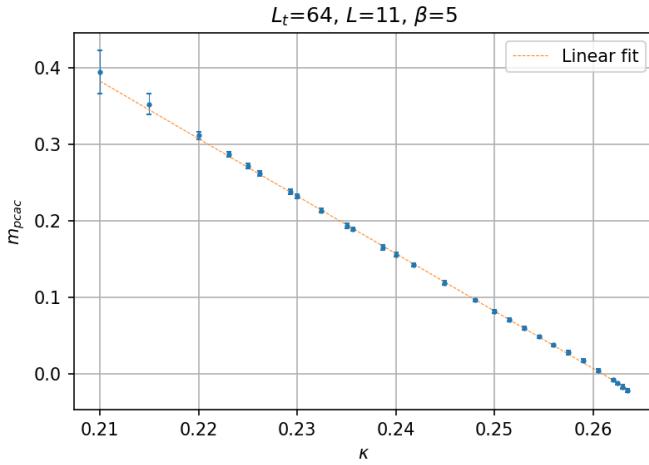
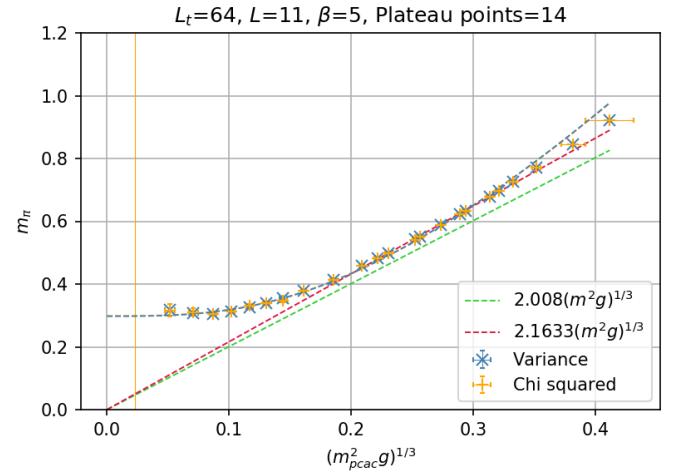


Figure 5: Number of configurations vs. topological charge on a 10×64 lattice.

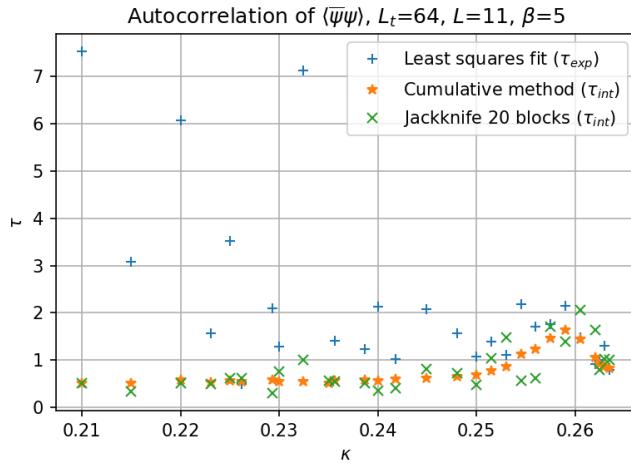
11x64



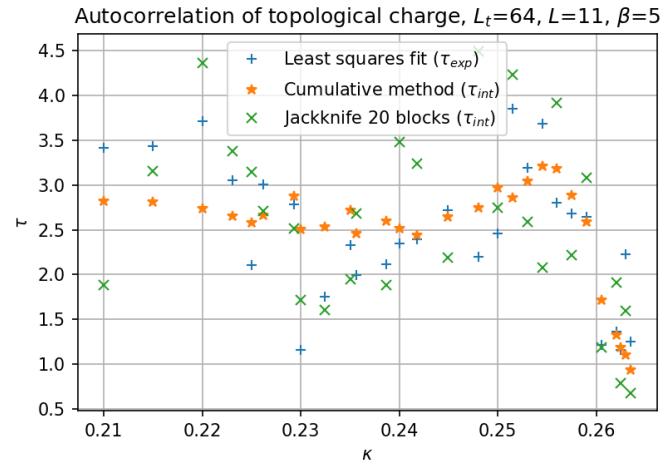
(a) Fermion mass using PCAC relation.



(b) A function of the form $y = \sqrt{a + bx^3}$ was fitted. Only $m_{pcac} > 0$ is considered.



(c) Autocorrelation of $\langle\bar{\psi}\psi\rangle$



(d) Autocorrelation of the topological charge

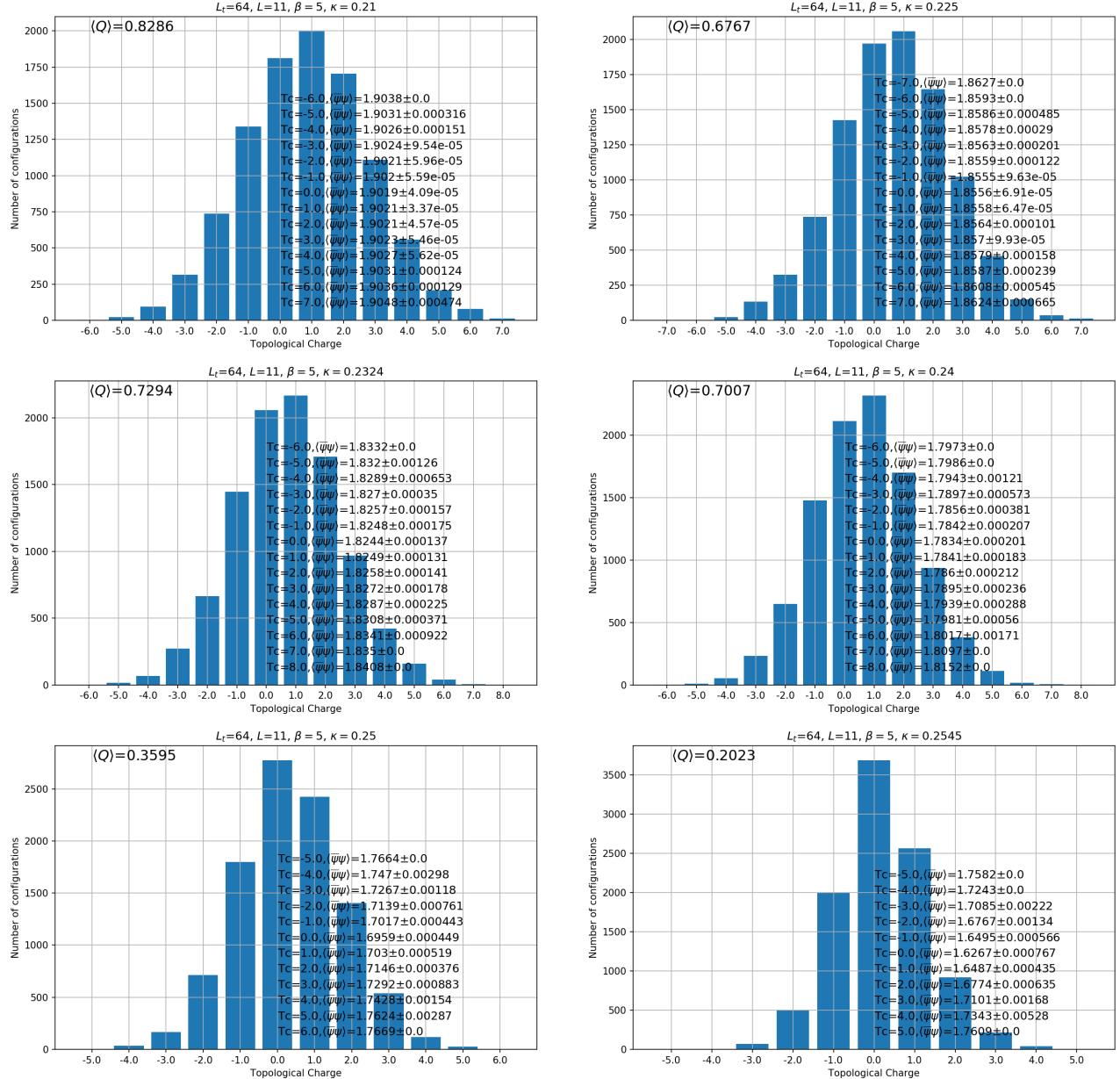
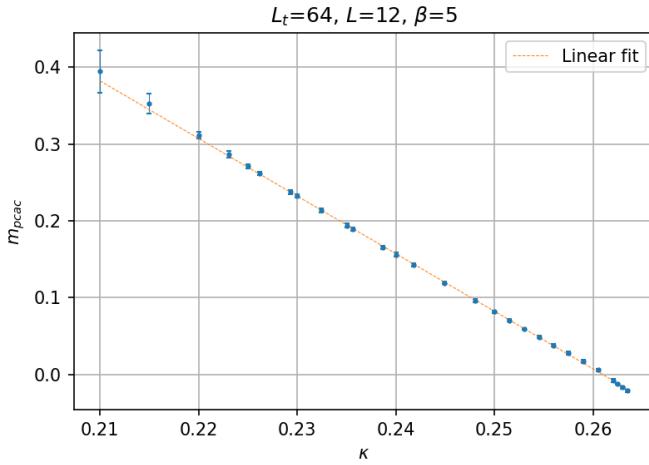
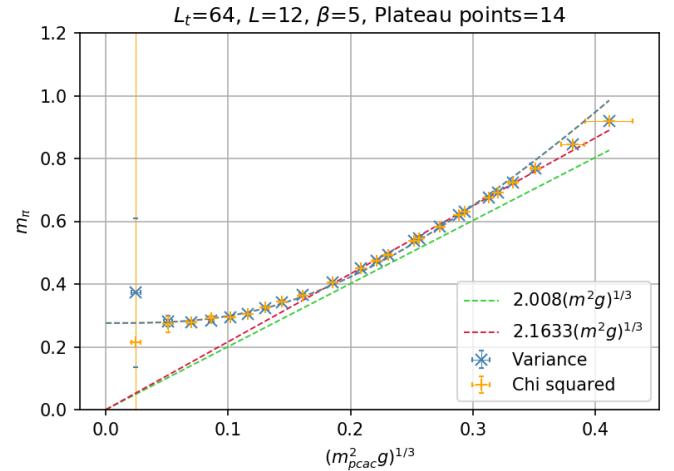


Figure 6: Number of configurations vs. topological charge on a 11×64 lattice.

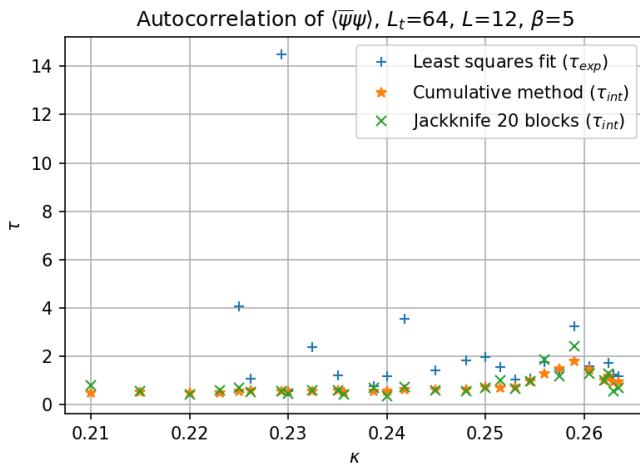
12x64



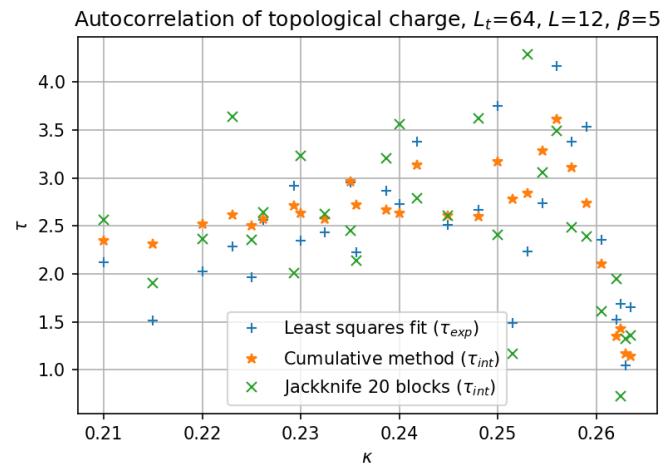
(a) Fermion mass using PCAC relation.



(b) A function of the form $y = \sqrt{a + bx^3}$ was fitted. Only $m_{pcac} > 0$ is considered.



(c) Autocorrelation of $\langle\bar{\psi}\psi\rangle$



(d) Autocorrelation of the topological charge

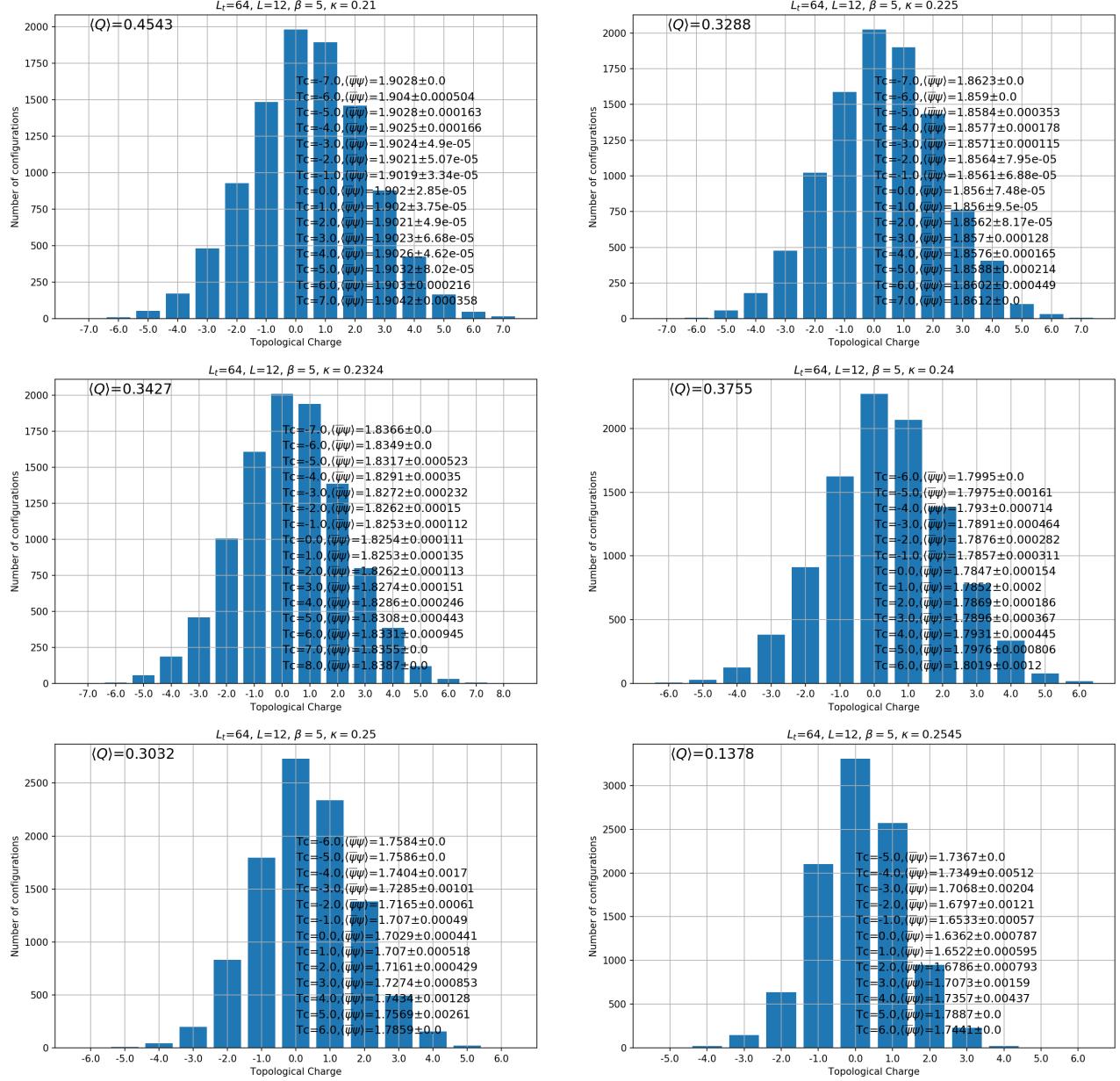


Figure 7: Number of configurations vs. topological charge on a 12×64 lattice.

Determining F_π

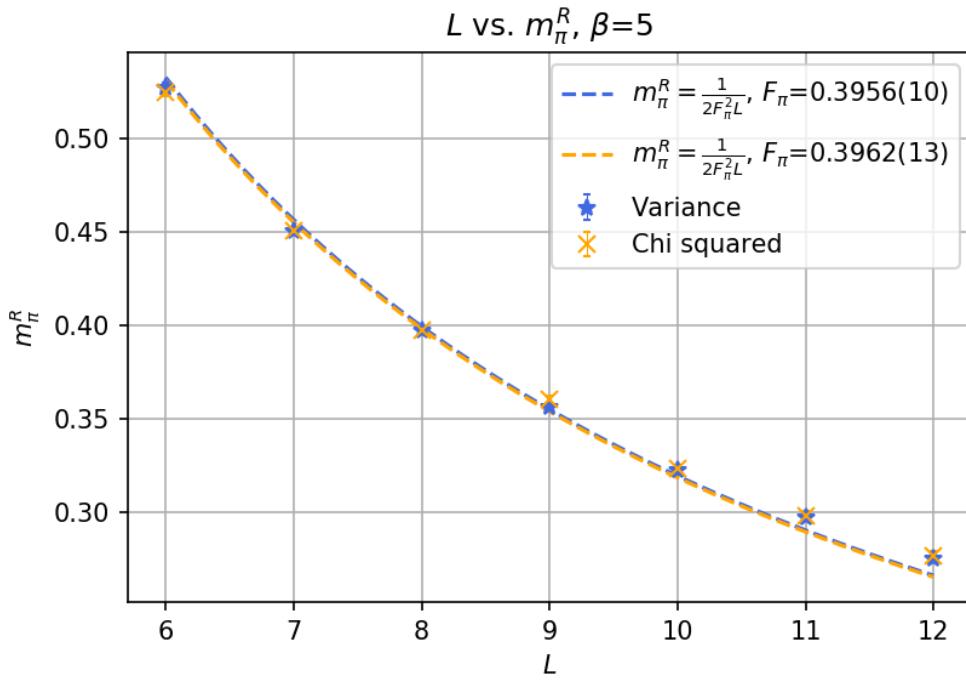


Figure 8: m_π^R vs. L . We fitted a function of the form $y = a/x$. For variance $F_\pi = 0.3956(10)$, while for chi squared $F_\pi = 0.3962(13)$.

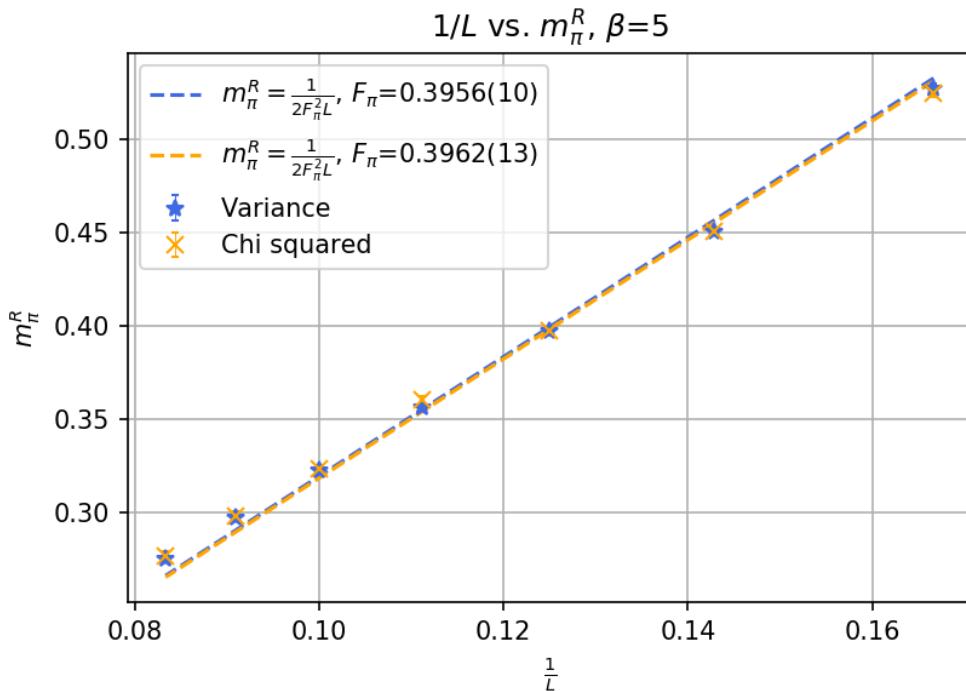


Figure 9: m_π^R vs. $1/L$. We fitted a function of the form $y = a/x$. For variance $F_\pi = 0.3956(10)$, while for chi squared $F_\pi = 0.3962(13)$.