Quenched topological susceptibility.

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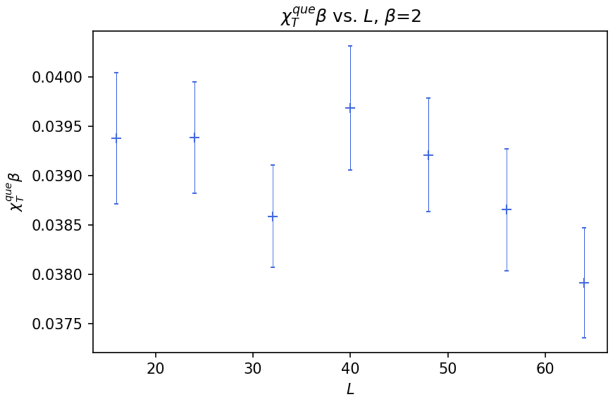
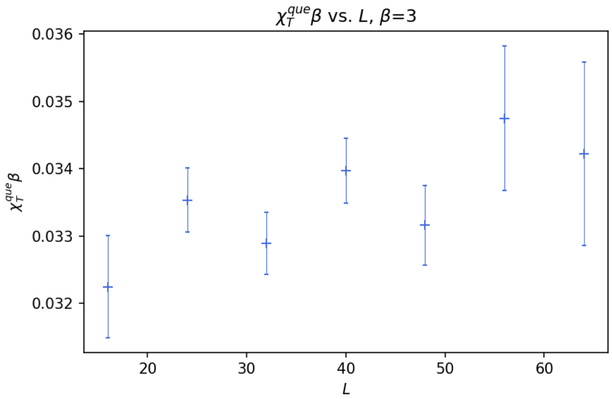
We show results of χ_T^{que} obtained by using the HMC algorithm for pure gauge theory. We used square lattices of dimensions $L \times L$. We also compare the values with χ_T^{que} computed in ref. [1] and with the analytic result by Seiler [2], which states that in infinite volume

$$\chi_T^{\mathrm{que}} = \frac{g^2}{4\pi^2} = \frac{1}{4\beta\pi^2}. \tag{1}$$



(a)



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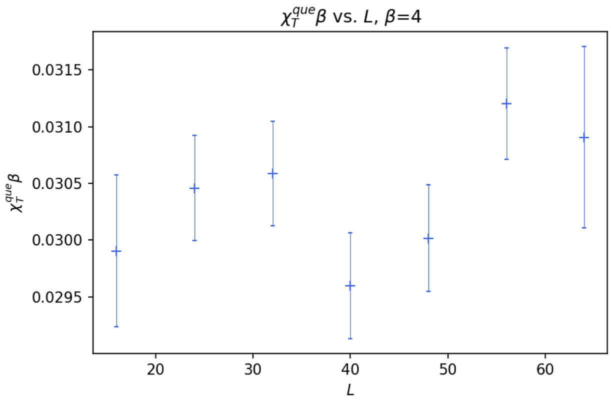

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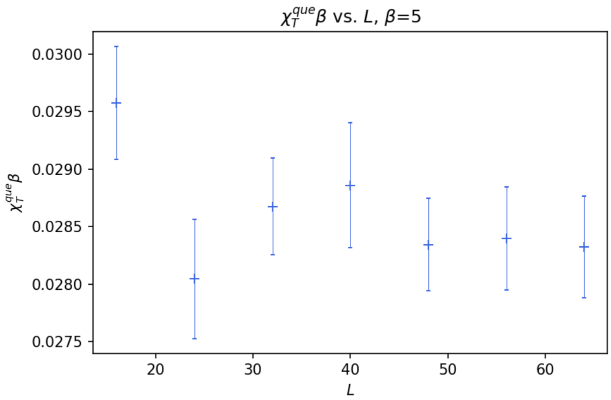

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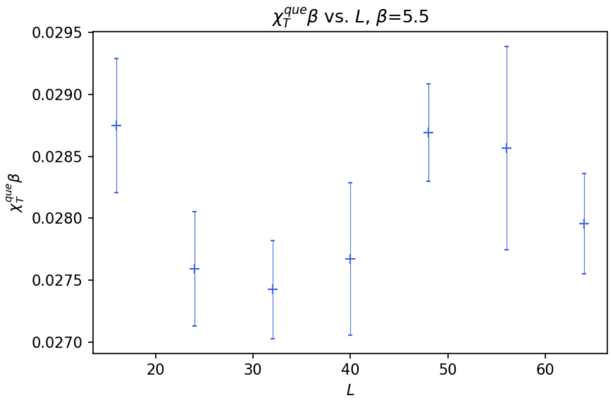

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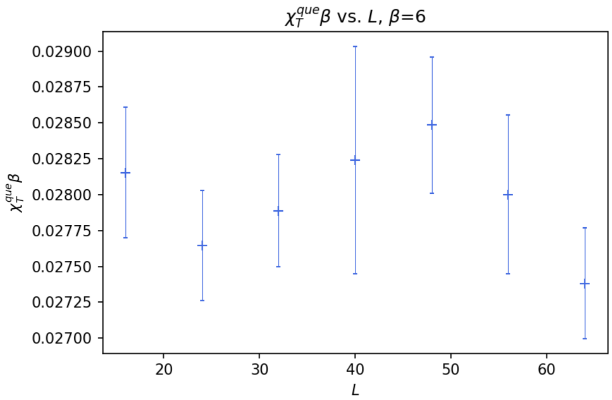

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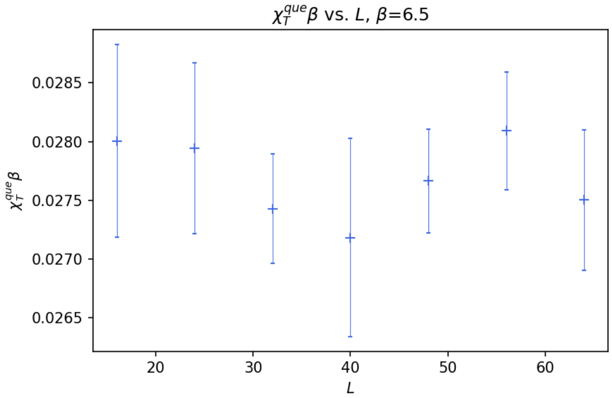

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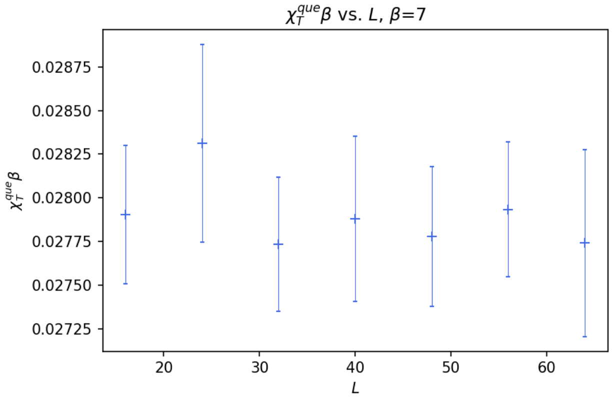

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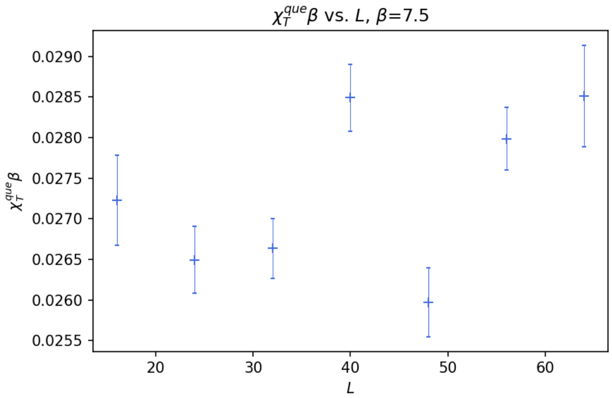
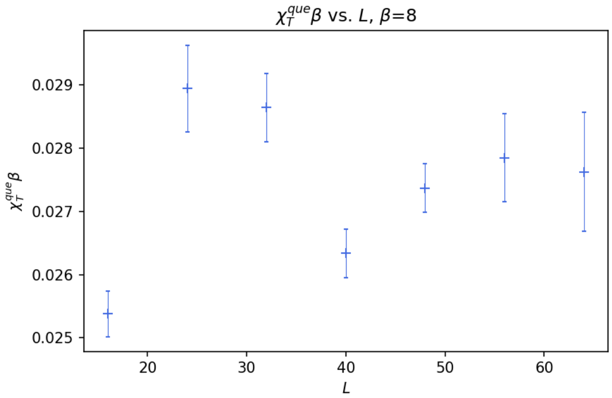


(i)



(j)

Figure 1: Quenched topological susceptibility. For $\beta = 2$ and 3 we performed 10^4 measurements separated by 10 sweeps. For $\beta = 4$ we performed 10^4 measurements separated by 10^2 sweeps. For $\beta = 5, 5.5, 6, 6.5, 7, 7.5$ and 8, 10^4 measurements separated by 10^3 sweeps were performed.

β	$\chi_T^{\text{que}}\beta$
2	0.0389(2)
3	0.0335(3)
4	0.0304(2)
5	0.0286(2)
5.5	0.0281(2)
6	0.0279(1)
6.5	0.0277(1)
7	0.02789(1)
7.5	0.0273(3)
8	0.0274(4)

Table 1: Results of $\chi_T^{\text{que}}\beta$ for different β values obtained with pure gauge theory simulations. The values of $\chi_T^{\text{que}}\beta$ are an average of the results shown in fig. 1.

We fitted three different functions to the data set of Table 1 to extrapolate to $\beta \to \infty$, see fig. 2. A fit of the form $\chi_T^{\text{que}}\beta = a + b/\beta$, restricted to $\beta \geq 5$, yields $\chi_T^{\text{que}}\beta = 0.0263(6)$, a fit of the form $\chi_T^{\text{que}}\beta = a + b/\beta^c$ yields $\chi_T^{\text{que}}\beta = 0.0261(6)$ and a fit of the form $\chi_T^{\text{que}}\beta = a + b/\beta + c/\beta^2$ yields $\chi_T^{\text{que}}\beta = 0.0257(9)$. In fig. 3 we show the autocorrelation time of the topological charge, for different β values and $L = 64$.

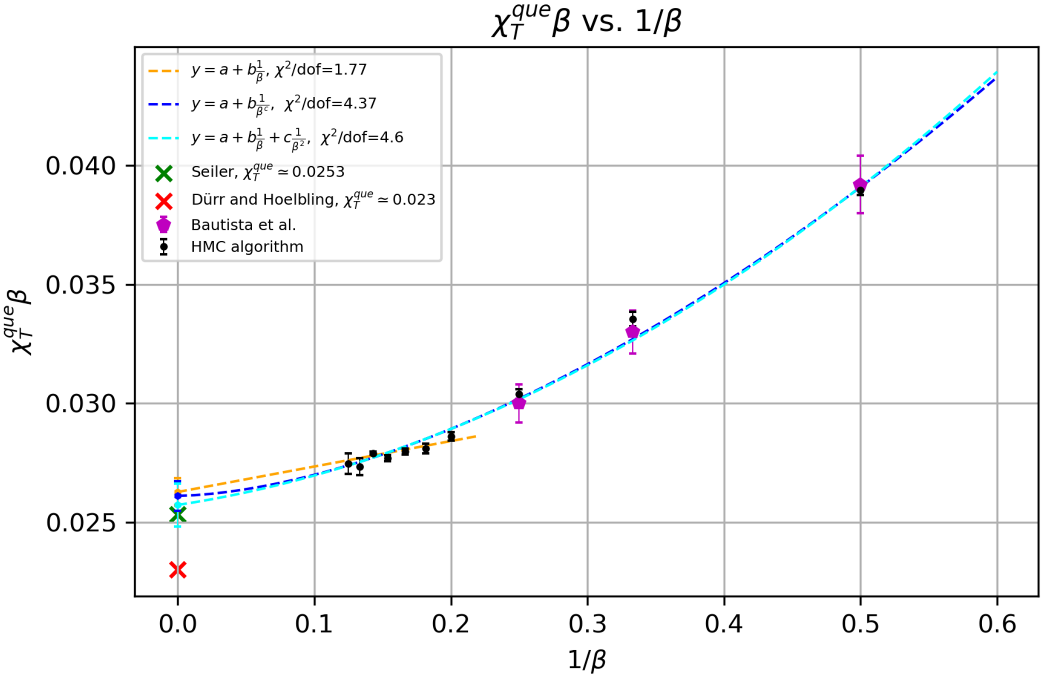


Figure 2: $\chi_T^{\text{que}}\beta$ vs. $1/\beta$. We used the data from Table 1 to perform three fits of the form $\chi_T^{\text{que}}\beta = a + b/\beta$, $\chi_T^{\text{que}}\beta = a + b/\beta^c$ and $\chi_T^{\text{que}}\beta = a + b/\beta + c/\beta^2$. The fit parameters of the former fit are $a = 0.0263(6)$, $b = 0.0107(37)$, of the second fit are $a = 0.0261(6)$, $b = 0.0413(60)$, $c = 1.67(25)$ and the parameters of the second degree polynomial are $a = 0.0257(9)$, $b = 0.0088(76)$, $c = 0.036(12)$.

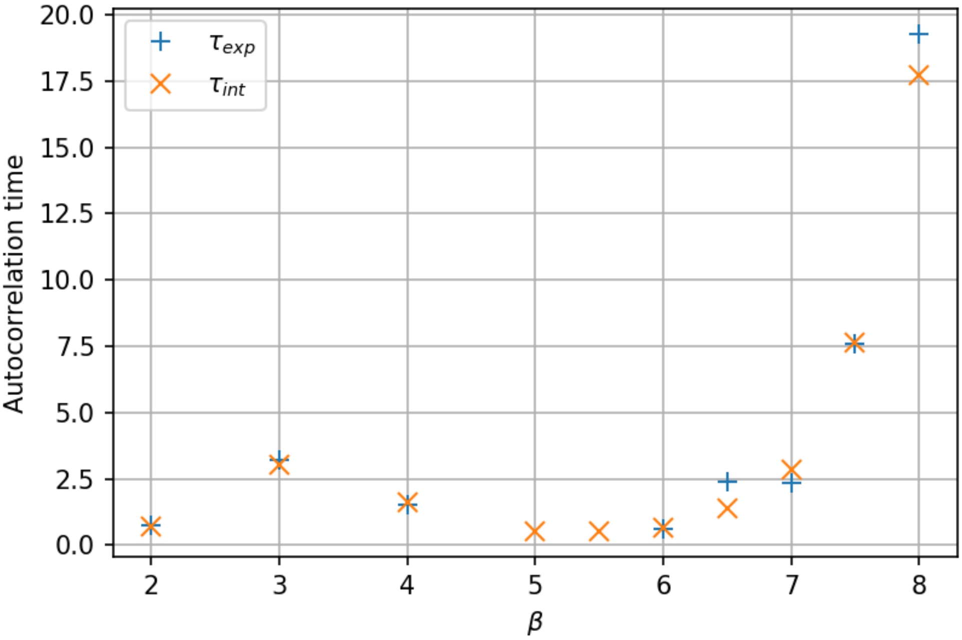


Figure 3: Exponential and integrated autocorrelation times of the topological charge for different β values and $L = 64$.

References

[1] I. Bautista, W. Bietenholz, A. Dromard, U. Gerber, L. Gonglach, C. P. Hofmann, H. Mejía, and M.Wagner, *Phys. Rev. D* **92** (2015)

[2] E. Seiler, *Phys. Lett. B* **525** (2002).

[3] S. Dürr and C. Hoelbling. *Phys. Rev. D* **71** (2005).