

# Computation of latent heat based on the energy distribution histogram in the 3D Ashkin-Teller model

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This paper presents a method of computation of latent heat based on the energy distribution histogram [1] for the first time applied to the 3D standard Ashkin-Teller (AT) model, one of the most important reference points in statistical physics. This model is of current interest (a dozen papers published every year). Similarly as in the original method for the  $q$ -state Potts model [1], for strong order phase transitions we observe characteristic histogram with two peaks in the critical region. Positions of two minima of negative logarithm of internal energy  $E$  probability for samples of finite size  $L \times L \times L$  appearing at  $E_+$  and  $E_-$  show good linear scalability to the thermodynamic limit ( $E_+$  is the  $E$  value at a critical point on the ordered side and  $E_-$  on the disordered one). The latent heat values are consistent with the ones obtained by us using the analysis of the behavior of the cumulants of the type of Challa  $V_L$  [1] and Lee  $U_L$  [1], modified by Musiał [2,3].

## References:

- [1] J. Lee, J. M. Kosterlitz, Phys. Rev. 43, 3265 (1991)
- [2] G. Musiał, Phys. Rev. B 69, 024407 (2004)
- [3] D. Jeziorek-Kniola, G. Musiał, Z. Wojtkowiak, Acta Phys. Polon. A 127, 327 (2015)