Contribution ID: **8** Type: **not specified**

Renormalization group and probability theory: distribution of the order parameter at criticality

Monday, 25 July 2022 14:55 (25 minutes)

Authors: Ivan Balog, Adam Rançon, Bertrand Delamotte; The question of probabilistic interpretation of the renormalization group has been around since the beginning of the subject of the renormalization group in the '70 [1], yet to this day no systematic approach exists for making practical calculations in cases when constituents of the system are strongly correlated, e.g. approaching criticality. Using functional renormalization group and the effective average action formalism [2], we write down a flow equation for the rate function $I(m)$, which determines the scaling function of the critical distribution of the order parameter $P(m)$, $I(m) = -ln(P(m))$. We show that I is a universal function parametrized by $\zeta = \xi/L$ characterizing the approach to criticality. Monte Carlo results for different $\zeta = \xi/L$ collapse closely to the rate functions for different ζ determined from the renormalization group. For all cases when $\zeta > 1$ the shape of the rate function is largely similar, yet not identical, to the shape of the fixed point (dimensionless) effective potential, featuring concavity near the origin. [1] G. Jona-Lasinio: Il Nuovo Cimento, 26, 99 (1975) [2] J. Berges, N. Tetradis, and C. Wetterich, Phys. Rep. 363, 223 (2002).

Presenter: BALOG, Ivan