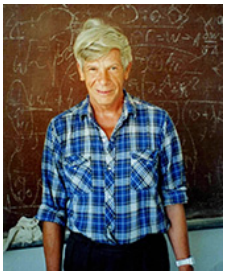

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Arising of mass in scalar quantum field theories.

Monday, 10 October 2022 18:00 (25 minutes)

We investigate massive models of quantum field theory of scalar field in logarithmic dimensions in Euclidean space. The Schwinger-Dyson equation and non-trivial solution for mass are considered in the paper.

The Schwinger-Dyson equation has the form:
D−1=Δ−1−Σ
where D is a full propagator, Δ is a bar propagator, Σ is a self-energy operator. In the minimal subtraction (MS) scheme it holds:
Δ(p)=1p2
where p is a momentum. The inverse full propagator has the following characteristic:
ϵ{D−1(p)|p2=−m2=0(∂∂(p2)D−1(p))||p2=−m2=1A.
In the main approximation of perturbation theory it holds:
D(p)=Ap2+m2
where A is an amplitude, m is a mass. We investigate the scalar models ϕ3, ϕ4 and ϕ6. For the theories ϕ3 and ϕ4 mass appears in the first order of perturbation theory whereas for the ϕ6-theory the mass does not appear in the first order.

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