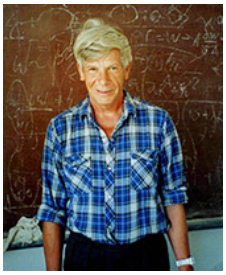

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Schwinger-Keldysh diagram technique for instantonic systems

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Schwinger-Keldysh diagram technique is usually involved in the calculation of real-time in-in correlation functions. In the case of thermal state, one can analytically continue imaginary time Matsubara correlation functions to real times. However, not all real-time correlation functions can be obtained by such procedure. Moreover, the numerical analytic continuation is an ill-posed problem. Thus, even in the case of thermal state one may need for Schwinger-Keldysh formalism. If the potential of the system admits degenerate minima, instantonic effects enter the game, so one should also integrate over instantonic moduli space, including the one, corresponding to the imaginary time translational invariance. However, Schwinger-Keldysh closed time contour explicitly breaks such invariance. We argue, that this invariance must be recovered, and show, how it can be done. After that, we construct an extension of Schwinger-Keldysh diagram technique to instantonic systems and demonstrate it on some instructive examples.

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