On hierarchies of evolution equations for correlations of many quantum particles

Viktor Gerasimenko
Institute of mathematics of NAS of Ukraine, Kyiv, Ukraine

In the talk, we discuss an approach to describing the correlations in a system of many quantum particles based on the hierarchy of evolution equations for the sequence of correlation operators which are cumulants of density operators (the von Neumann hierarchy). It is established that the constructed dynamics of correlations underlies the description of the dynamics of both finitely and infinitely many quantum particles governed by the BBGKY hierarchies for reduced density operators or reduced correlation operators. The structure of expansions by which are represented non-perturbative solutions of the Cauchy problem to these hierarchies of evolution equations is established.

Moreover, the problem of the rigorous description of the collective behavior of many-particle quantum systems by means of a one-particle correlation operator governed of the generalized quantum kinetic equation with initial correlations, in particular, correlations characterizing the condensed states is considered.

References

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