



Contribution ID: 38

Type: Parallel talk

## On the pair correlations of neutral $K$ , $D$ , $B$ and $B_s$ mesons with close momenta produced in inclusive multiparticle processes

Thursday, 11 July 2019 11:30 (18 minutes)

The phenomenological structure of inclusive cross-sections of the production of two neutral  $K$  mesons in hadron–hadron, hadron–nucleus and nucleus–nucleus collisions is theoretically studied taking into account the strangeness conservation in strong and electromagnetic interactions. Relations for the dependence of correlations of two short-lived and two long-lived neutral kaons

$K_S^0 K_S^0$ ,  $K_L^0 K_L^0$  and correlations of “mixed” pairs  $K_S^0 K_L^0$  at small relative momenta upon the space-time parameters of the generation region of  $K^0$  and  $\bar{K}^0$  mesons are obtained – involving the contributions of Bose-statistics and  $S$ -wave strong final-state interaction of two  $K^0$  ( $\bar{K}^0$ ) mesons and of the  $K^0$  and  $\bar{K}^0$  mesons, as well as the additional one of transitions  $K^+ K^- \rightarrow K^0 \bar{K}^0$ , and depending upon the relative fractions of generated pairs  $K^0 K^0$ ,  $\bar{K}^0 \bar{K}^0$ ,  $K^0 \bar{K}^0$ . It is shown that under the strangeness conservation the correlation functions of the pairs  $K_S^0 K_S^0$  and  $K_L^0 K_L^0$ , produced in the same inclusive process, coincide, and the difference between the correlation functions of the pairs  $K_S^0 K_S^0$  and  $K_S^0 K_L^0$  is conditioned exclusively by the generation of pairs of non-identical neutral kaons  $K^0 \bar{K}^0$ .

For comparison, analogous correlations for the pairs of neutral heavy mesons  $D^0$ ,  $B^0$  and  $B_s^0$ , produced in multiple inclusive

processes with charm (beauty) conservation, are also theoretically analyzed – neglecting, just as for the case of  $K^0$  mesons, the weak effects of  $CP$  violation. These correlations have the quite similar character and they are described by quite similar expressions: in particular, just as for  $K^0$  mesons, the correlation functions for the pairs of states with the same  $CP$  parity ( $R_{SS} = R_{LL}$ ) and with different  $CP$  parity ( $R_{SL}$ ) do not coincide, and the difference between them is conditioned exclusively by the production of pairs  $D^0 \bar{D}^0$ ,  $B^0 \bar{B}^0$  and  $B_s^0 \bar{B}_s^0$ . However, contrary to the case of  $K^0$  mesons, here the distinction of  $CP$ -even and  $CP$ -odd states (and, hence, the experimental observation of respective pair correlations) encounters difficulties – due to the insignificant differences of their lifetimes and the relatively small probability of purely  $CP$ -even and  $CP$ -odd decay channels. Nevertheless, one may expect that this will become possible at future colliders.

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**Session Classification:** Heavy Ion Physics

**Track Classification:** Heavy Ion Physics