Pairing dynamics in nuclear collisions*

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I will present the results of nuclear collisions involving medium mass or heavy nuclei, obtained within time-dependent density functional theory (TDDFT) extended to superfluid systems. I will discuss the possible manifestations of pairing dynamics in nuclear collisions, at the vicinity of the Coulomb barrier. These include the mechanism for the increase of the barrier for capture generated by solitonic excitation appearing as a result of pairing phase distortion [1, 2] (see Fig1 inset). I will show how this additional barrier affects the total kinetic energies of the fragments after separation. Moreover, I will discuss pairing instability occurring in di-nuclear system formed by merging magic nuclei which lead to significant enhancement of pairing correlations [3] (see Fig1).

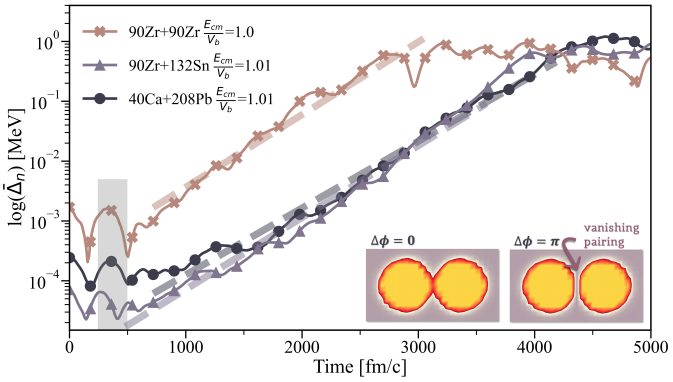

FIG. 1: Modified figure taken from [3]. Figure presents the manifestation of the pairing enhancement after the collision ($t_c \sim$ gray area). After the contact time the average pairing gap increases exponentially and reaching the value of $\sim 1MeV$. This phenomenon is generic and is present in different systems. The snapshot presents the vanishing pairing when the two phases of the superfluid state differs by π leading to increased barrier for merging and affecting the total kinetic energy of the fragments after separation.

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