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Microscopic study of alpha, two-alpha and cluster decays

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Using covariant energy density functional approach, it was recently possible to describe alpha decay, on both medium mass and heavy nuclei [1]. Using the same formalism, a new mode of radioactivity was predicted [2]. In such a mode, 2 alpha particles are emitted back-to-back, contrary to a ^8Be -like cluster mode. Cluster decay will also be analyzed with this approach [3].

Information brought by such a formalism on the preformation and the localization of the alpha particle in the nuclei will be discussed [4]. Indications on possible favorable candidates to experimentally search for 2 alpha decays with radioactive beams will also be given.

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[2] F. Mercier, J. Zhao, J.-P. Ebran, E. Khan, T. Nikšić, D. Vretenar, Phys. Rev. Lett. 127, 012501 (2021)

[3] J. Zhao, J. P. Ebran, L. Heitz, E. Khan, F. Mercier, T. Nikšić, and D. Vretenar, arXiv:2211.14135 (2022)

[4] E. Khan, L. Heitz, F. Mercier, J. P. Ebran, Phys. Rev. C 106, 064330 (2022)

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