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Alpha clustering in strong electromagnetic fields

1) The influence of a strong laser electromagnetic field on the alpha-decay rate is ingestigated by using the Hennenberger frame of reference [1] within adiabadic and static limits. The penetrability of the Coulomb barrier becomes anisotropic for intensities corresponding to $D \sim 1$, where D is an adimensional parameter proportional to the square root of the intensity. As a consequence, we predict that two counters placed at zero and 90 degrees will indicate different numbers. 2) Alpha clusters are born in nuclei at low densities, the wave function being a Gaussian peaked on the nuclear surface and therefore corresponding to a local pocket-like potential. The alpha-particle formation probability reaches the largest value in the "alpha-decay island" above ^{100}Sn for N$\sim$Z nuclei [2] and therefore the clusters can be easier detected. We show that the shape of the alpha-cluster can be determined by exciting it to the first resonant state inside the pocket-like potential, by using a quasi-monochromatic gamma-beam produced at the ELI-NP facility. The position and width of this "alpha-like pygmy" resonant state [3] can be predicted by using the alpha-decay systematics to ground and excited states [4].

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