

Quantum control via Landau-Zener-Stuckelberg-Majorana transitions

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Since the pioneering works by Landau, Zener, Stuckelberg, and Majorana (LZSM), it has been known that driving a quantum two-level system results in tunneling between its states. Even though the interference between these transitions is known to be important, it is only recently that it became both accessible, controllable, and useful for engineering quantum systems [1]. We study systematically various aspects of LZSM physics and review the relevant literature, significantly expanding the review article in Ref. [2]. In particular, we address such aspects as Majorana's approach, LZSM logic gates, and dynamics of multi-level systems.

[1] O. V. Ivakhnenko, S. N. Shevchenko, and F. Nori, arXiv:2203.16348

[2] S. N. Shevchenko, S. Ashhab, and F. Nori, Phys. Rep. 492, 1 (2010)