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**Tunneling of a system with internal degrees of freedom** VLADIMIR ZELEVINSKY, ALEXANDER SAKHARUK, National Superconducting Cyclotron Laboratory, Michigan State University — The tunneling reactions play crucial role in nuclear physics, astrophysics and chemical physics. However, the old question of how the internal structure of a tunneling composite object can influence the tunneling process remains poorly understood. We consider a model of a bound two-particle system tunneling through a potential barrier that acts only on one particle. In adiabatic motion, the intrinsic structure is adjusted as a function of the distance from the barrier (polarization effects). The effective potential for the tunneling of the center-of-mass of the two-body system is constructed and the penetrability coefficient is calculated. Comparison with standard point-like tunneling is done. Being simple enough to allow an accurate numerical solution, the problem is important for different physical and astrophysical applications. In addition, the problem allows straightforward generalizations to more realistic processes.

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