

## **On the Concept of Potential Energy**

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### Abstract

We study the concept of potential energy vs. interaction energy, as well as the related concepts of active and passive sources, and propose a criterium for determining the potential energy localized on each of the interacting particles. Both a classical and a relativistic derivation are presented, and the classical results are applied to the gravitational as well as the electrostatic interactions. The decomposition of the interaction energy of a two-particle system into the potential energies of the interacting particles permits defining a total energy per particle, and the criteria used for the decomposition, leads, in the center-of-mass frame, to the conservation of the total particle energy, in free fall, even in the presence of interactions. The postulated repartition of the interaction energy among the two interacting particles is coherent with the theories considered and consequently cannot make new experimental predictions within the context of these theories.