

Central Forces Effective Potentials

Keep in your notebook

In the Mathematica worksheet, <http://physics.oregonstate.edu/ph426/mathematica/cfeffpotential.nb>, you will be examining how various parameters affect the shape of the effective potential. Experiment with the different parameters and answer the following questions:

1. As you change ℓ , k , and μ , what happens to the shape of the effective potential? Make sure to look at both large r , small r . Look at the equation for V_{eff} as you do this. Can you see how the equation predicts these changes?
2. For a given constant value of the energy E , where are the classical turning points? How do the turning points change as you change the parameters ℓ , k , and μ ?
3. How do the energies and radii of possible circular orbits depend on ℓ , k , and μ ?
4. What happens if you choose a repulsive potential instead of an attractive one, i.e. change the sign of k .

by Corinne Manogue

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