Apsidal angle at very high energies

Use the result of [mex128] to show that for a central force potential with the property \( \lim_{r \to \infty} V(r) = \infty \), the apsidal angle of orbits with given angular momentum approaches a universal value at very high energy:

\[
\lim_{E \to \infty} \Delta \vartheta = \frac{\pi}{2}.
\]

Solution: