[mex242] Absorption cross section of power-law potential

A uniform beam of particles of mass m and velocity v_0 is directed toward an attractive power-law potential $V(r) = -\kappa/r^\alpha$ with $\alpha > 2$. Depending on the energy E and the angular momentum ℓ the orbit of the particle leads to the center of force or it passes by at a nonvanishing minimum distance. Assume that all particles that arrive at the center of force are absorbed whereas all other particles are scattered elastically. Calculate the total cross section σ_T for particle absorption as a function of α, E, κ.

Solution: