

A proton is fired from very far away towards a nucleus with charge $Q = 120 e$, where e is the electronic charge. It makes a closest approach of 10 fm to the nucleus. The de Broglie wavelength (in units of fm) of the proton at its start is ?

(Take: The proton mass $m_p = (5/3) \times 10^{-27} \text{ kg}$; $h/e = 4.2 \times 10^{-15} \text{ F}$; $1 \text{ fm} = 10^{-15} \text{ m}$)