

for opposite sign particles like a proton and an electron the energy will go down as  $r \uparrow$  for either particle

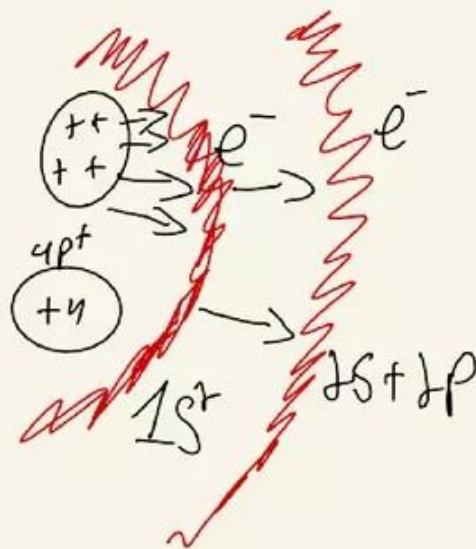
for opposite sign particles like  $p^+$  and an  $e^-$  the  $E \downarrow$  as  $r \uparrow$  for either particles

$|E| \uparrow$  but  $E < 0$

$e^-$  state is most stable for high nuclear charge,

1. **Shielding** :  $e^-$  cover the nucleus so high  $n$  (shell)  $e^-$  see a smaller  $(+)$  charge.  $Z_{eff}$  (effective molecular charge)

$Z_{eff} < Z$  (for  $n > 1$ )



2. Penetration: lower  $l$  subshells are better at "seeing through" (penetration) the  $e^-$  shield

$l = 0$	$s$
$1$	$p$
$2$	$d$
$3$	$f$

$e^-$  configuration: to get order of  $e^-$  shell filling use the aufbau principle

Energy order of  $n$  \_\_\_\_\_

$1s$   
 $2s 2p$   
 $3s 3p 3d$   
 $4s 4p 4d 4f$   
 $5s 5p 5d 5f$   
 $6s 6p 6d 6f$

