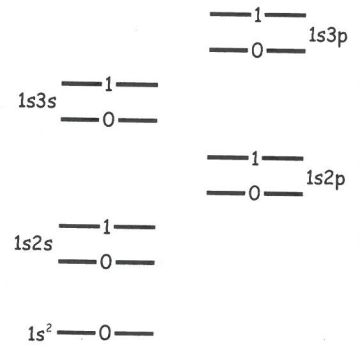


11.25) T2D II FIG 11.3, RIGHT, SHOWS THE LOWEST ENERGY LEVELS OF He WITH POSSIBLE OCCUPATIONS.

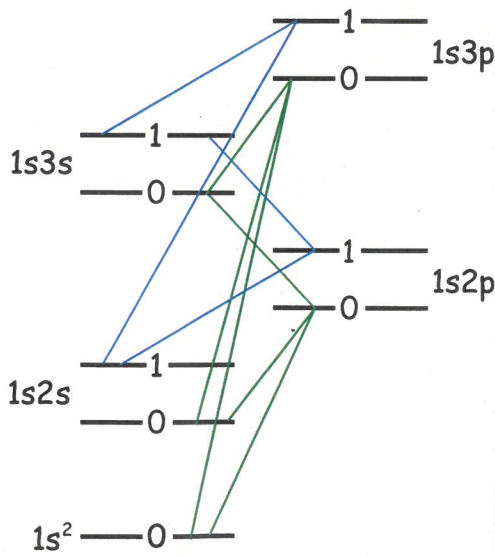
- LABELS SHOW  $e^-$  LEVELS  
e.g.  $1s3s \Rightarrow 1e^-$  IN  $1s$ ,  $1e^-$  IN  $3s$
- 0 AND 1 INDICATE SPINS  
0  $\Rightarrow$  ANTIPARALLEL SPINS  
1  $\Rightarrow$  PARALLEL SPINS  $\Rightarrow$  HIGHER ENERGY



- EXPLAIN WHY  $1s^2$  HAS ONLY ONE 0 CONFIGURATION T2D II FIG 11.3
- INDICATE THE ALLOWED TRANSITIONS.
- EXPLAIN WHICH LEVELS ARE METASTABLE

a) THE PAULI EXCLUSION PRINCIPLE REQUIRES THAT 2  $e^-$  IN THE SAME LEVEL HAVE OPPOSITE SPINS. THE  $1s$  IS A SINGLE LEVEL, SO THERE CAN ONLY BE A "0" STATE.

b) ALLOWED TRANSITIONS HAVE  $\Delta l = \pm 1$  AND  $\Delta s = 0$ . THIS THE SPIN OF AN  $e^-$  CAN'T CHANGE  $\Rightarrow$  A "0" LEVEL  $e^-$  CAN'T TRANSITION TO A "1" LEVEL



$\Delta l = \pm 1 \Rightarrow$  ONLY TRANSITIONS BETWEEN COLUMNS ARE ALLOWED

$\Delta s = 0 \Rightarrow$  "0" MUST TRANSITION TO "0"  
"1" " " " " "1"

← ALLOWED TRANSITIONS

c) THE  $1s2s$  STATE IS METASTABLE SINCE NO DOWNWARD TRANSITION IS ALLOWED ( $\Delta l = 0$ !)

$1s2s$  = ONLY METASTABLE STATE.