Electron Configuration

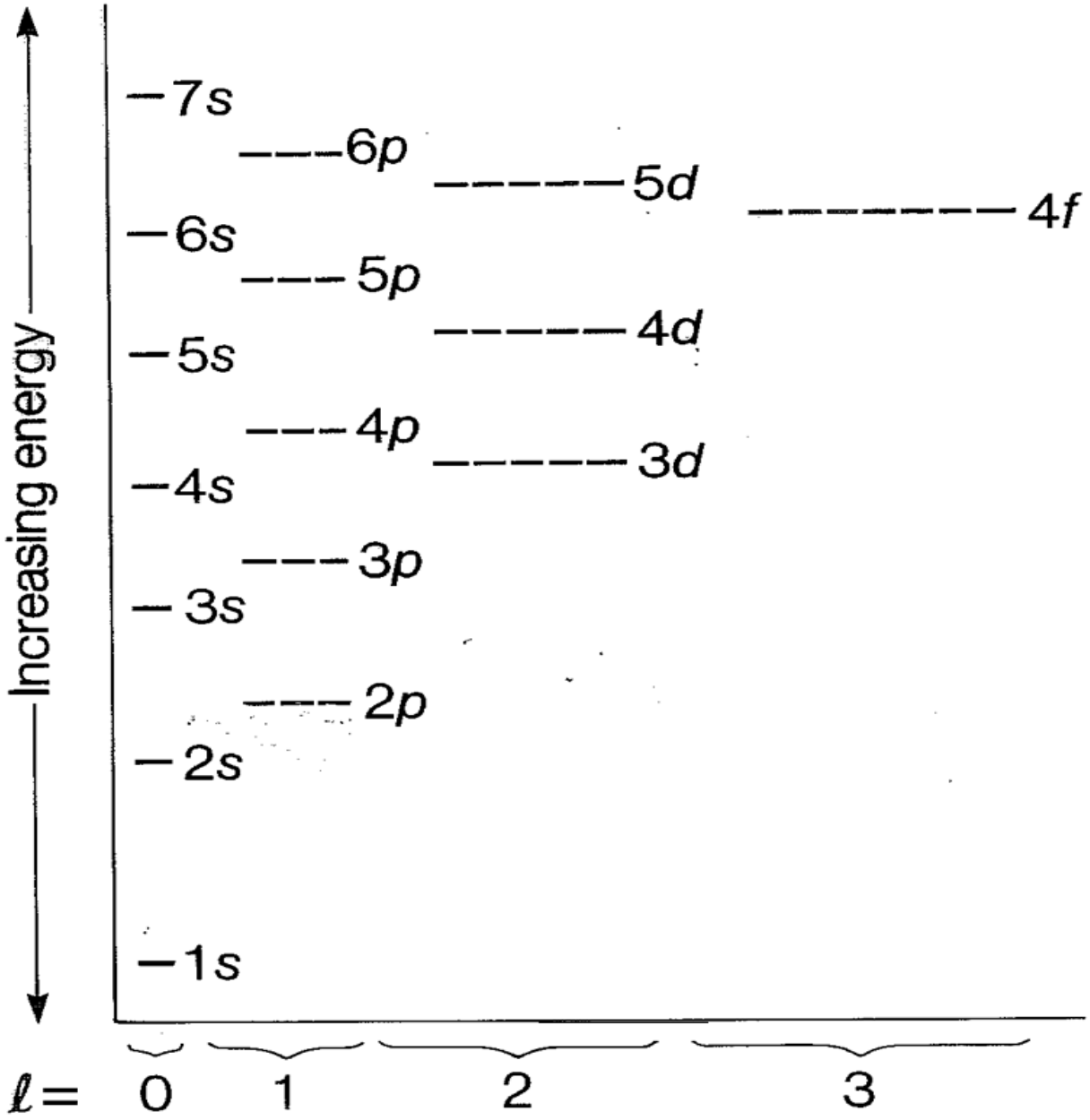
Three rules are used to build the electron configuration:

- Aufbau principle
- Pauli Exclusion Principle
- Hund's Rule

Aufbau Principle

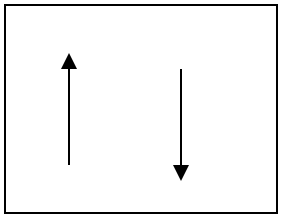
- Electrons occupy orbitals of lower energy first.

Aufbau Diagram



-Pauli Exclusion Principle (Wolfgang Pauli, Austria, 1900-1958) -Electron Spin Quantum Number

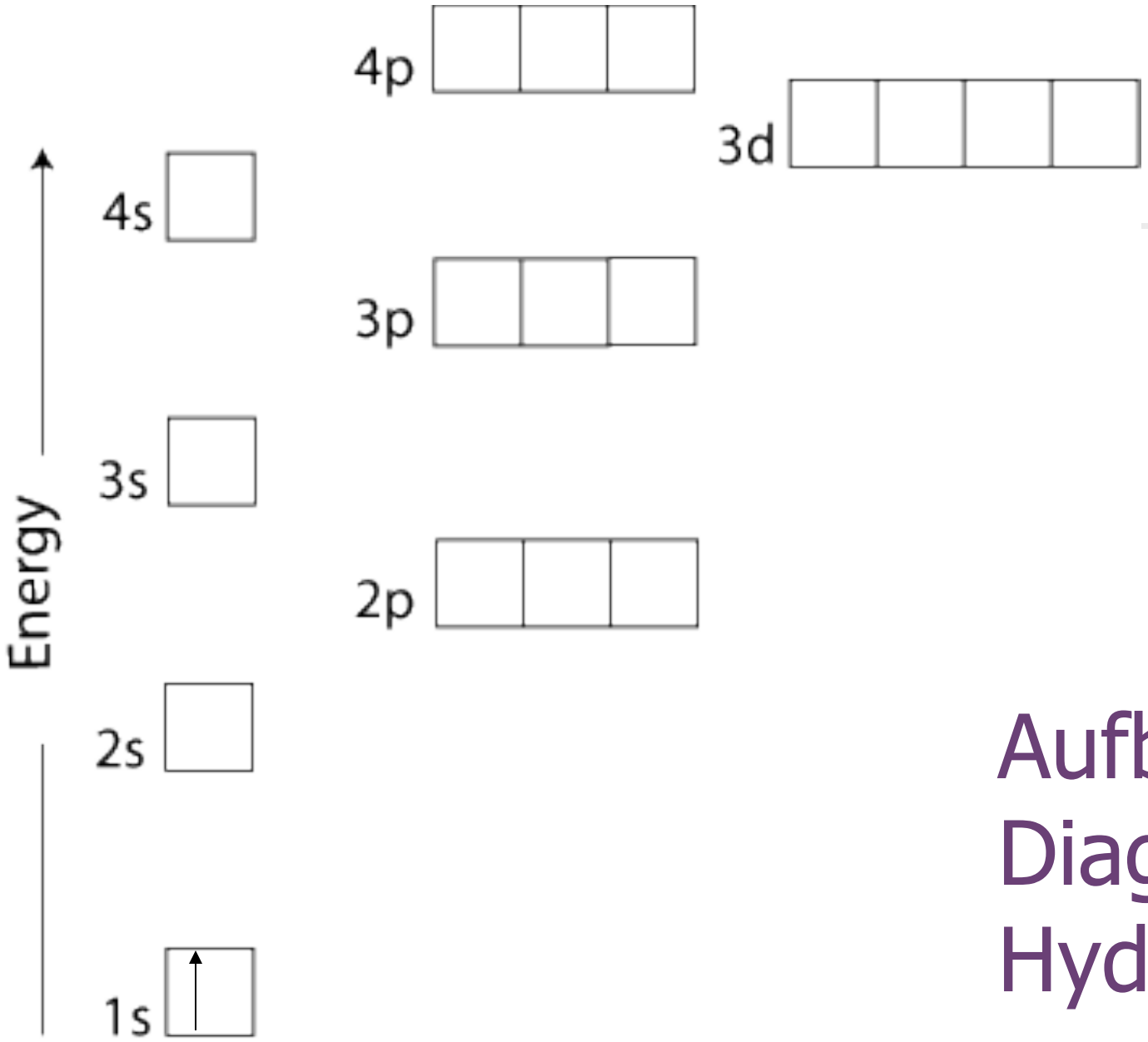
- An orbital can hold only two electrons and they must have opposite spin.



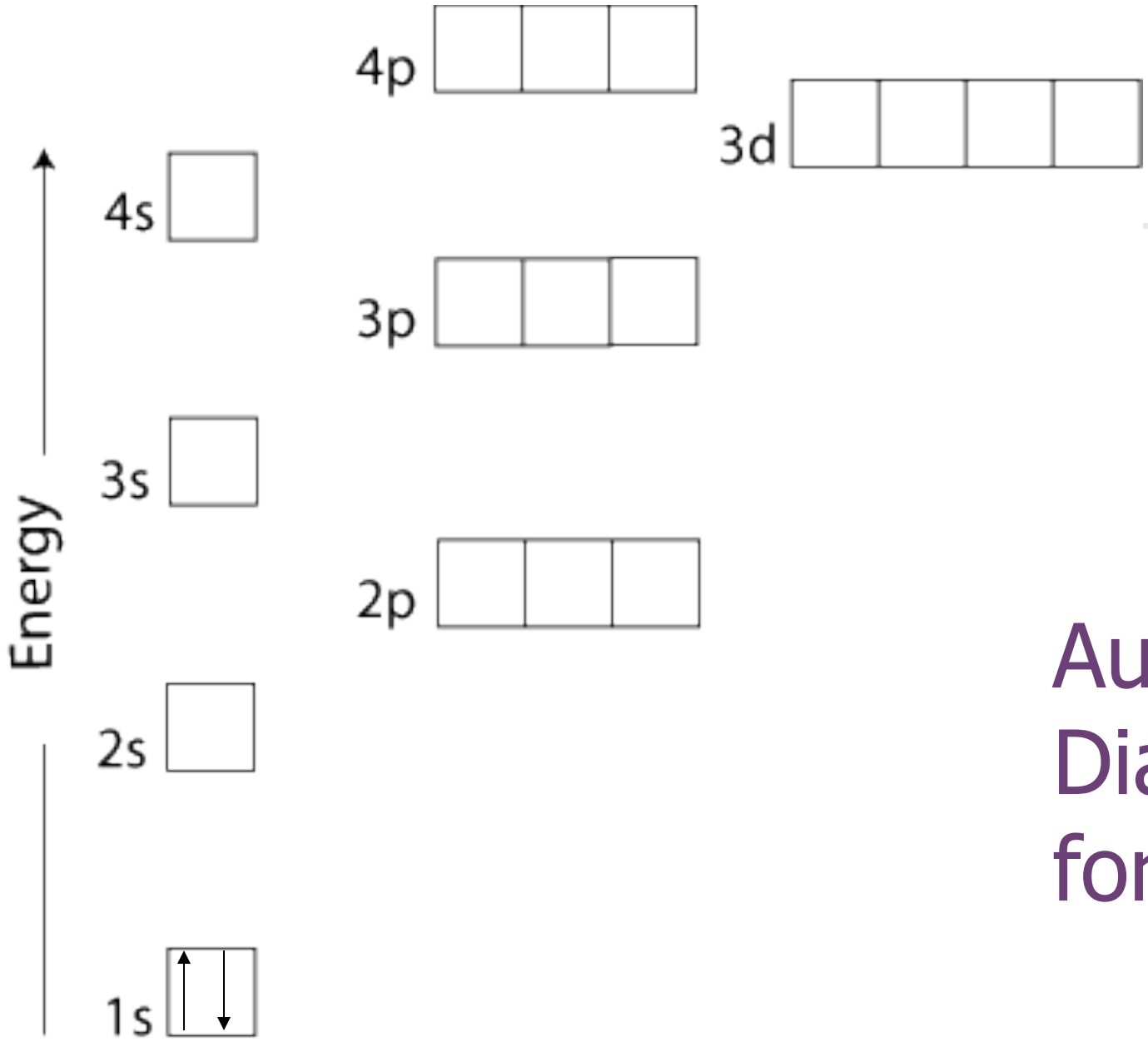
Hund's Rule

In a set of orbitals, the electrons will fill the orbitals in a way that would give the maximum number of parallel spins (maximum number of unpaired electrons).

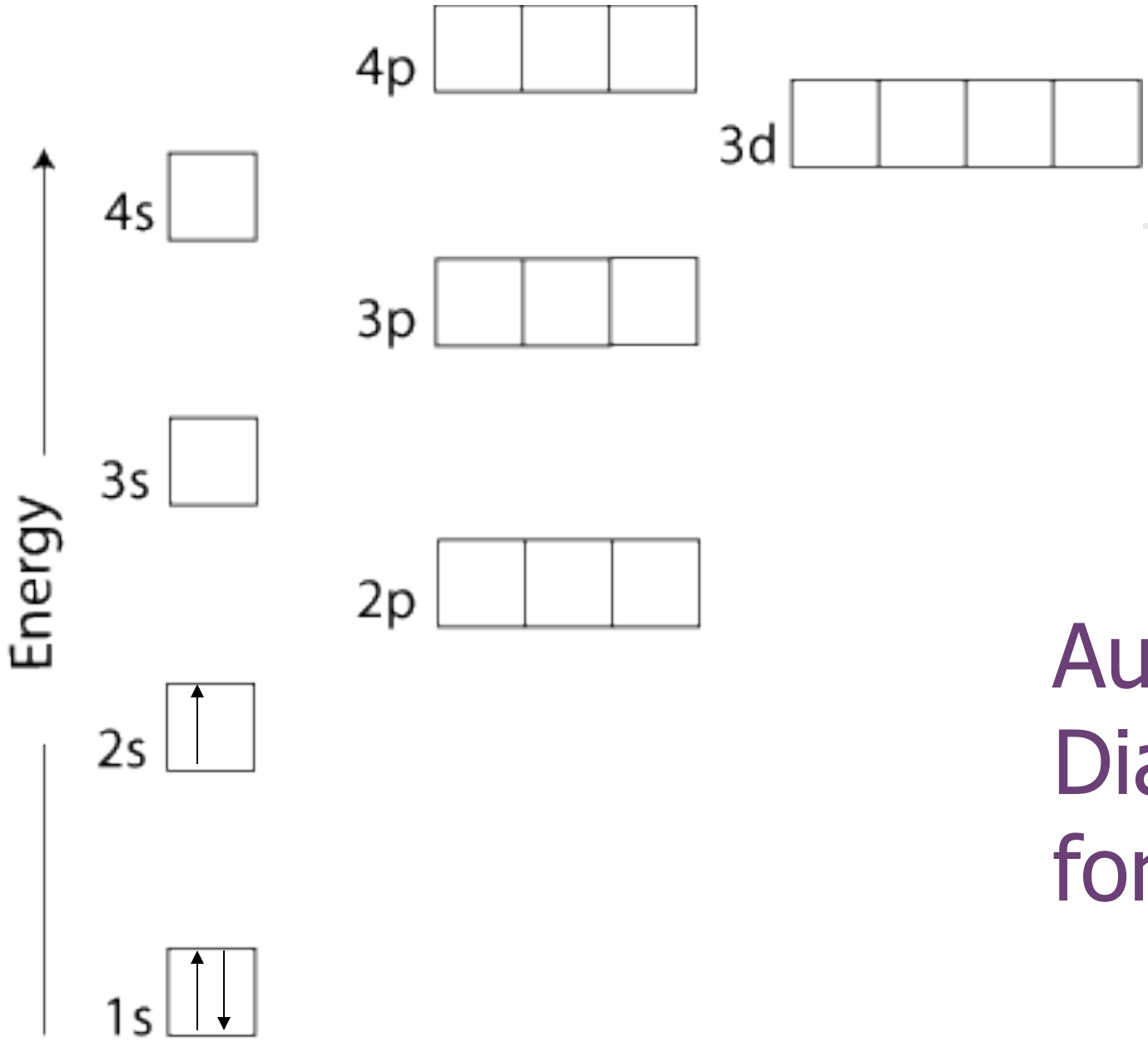
Analogy: Students could fill each seat of a school bus, one person at a time, before doubling up.



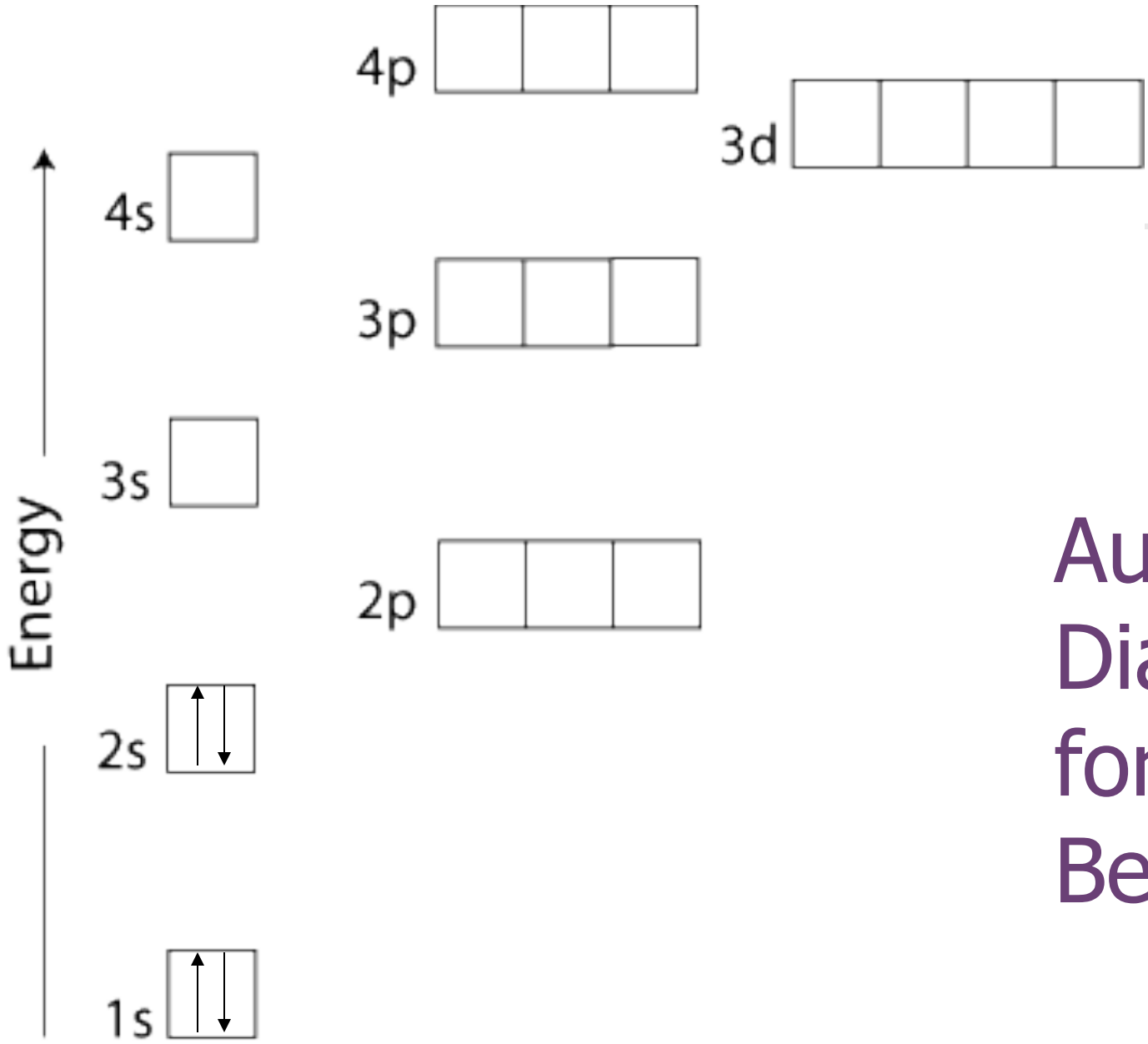
Aufbau Diagram for Hydrogen



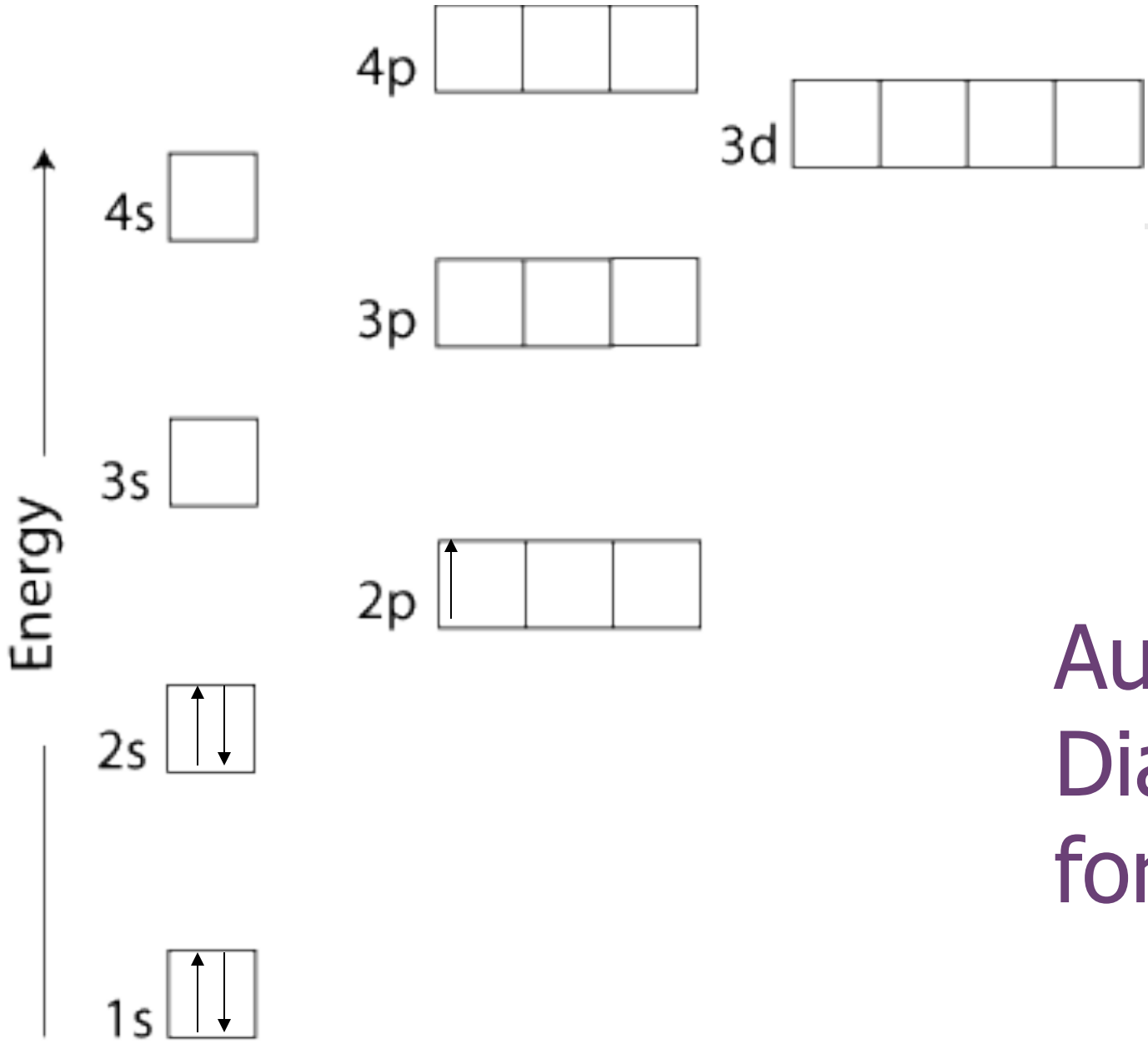
Aufbau Diagram for Helium



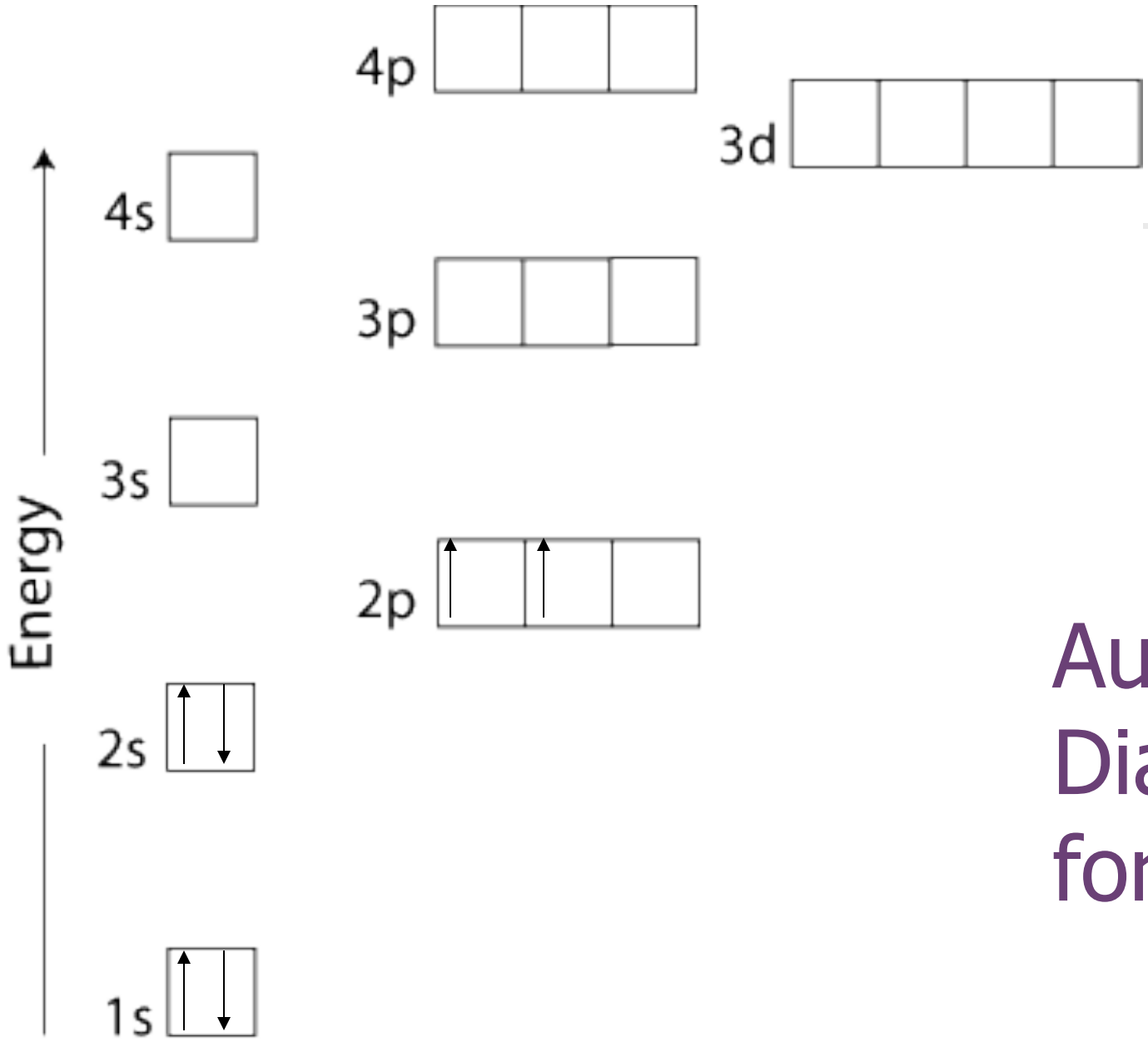
Aufbau Diagram for Lithium



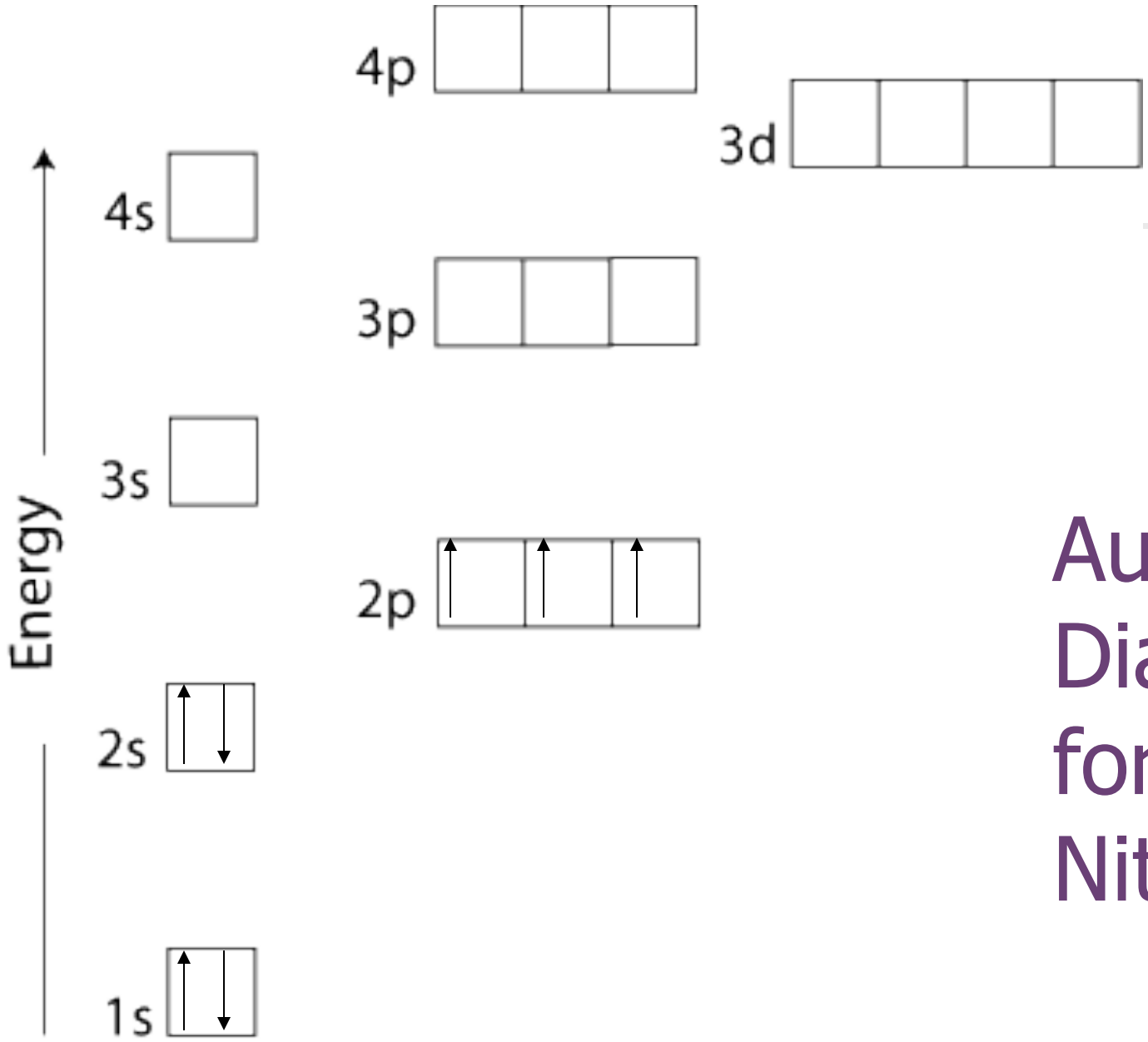
Aufbau Diagram for Beryllium



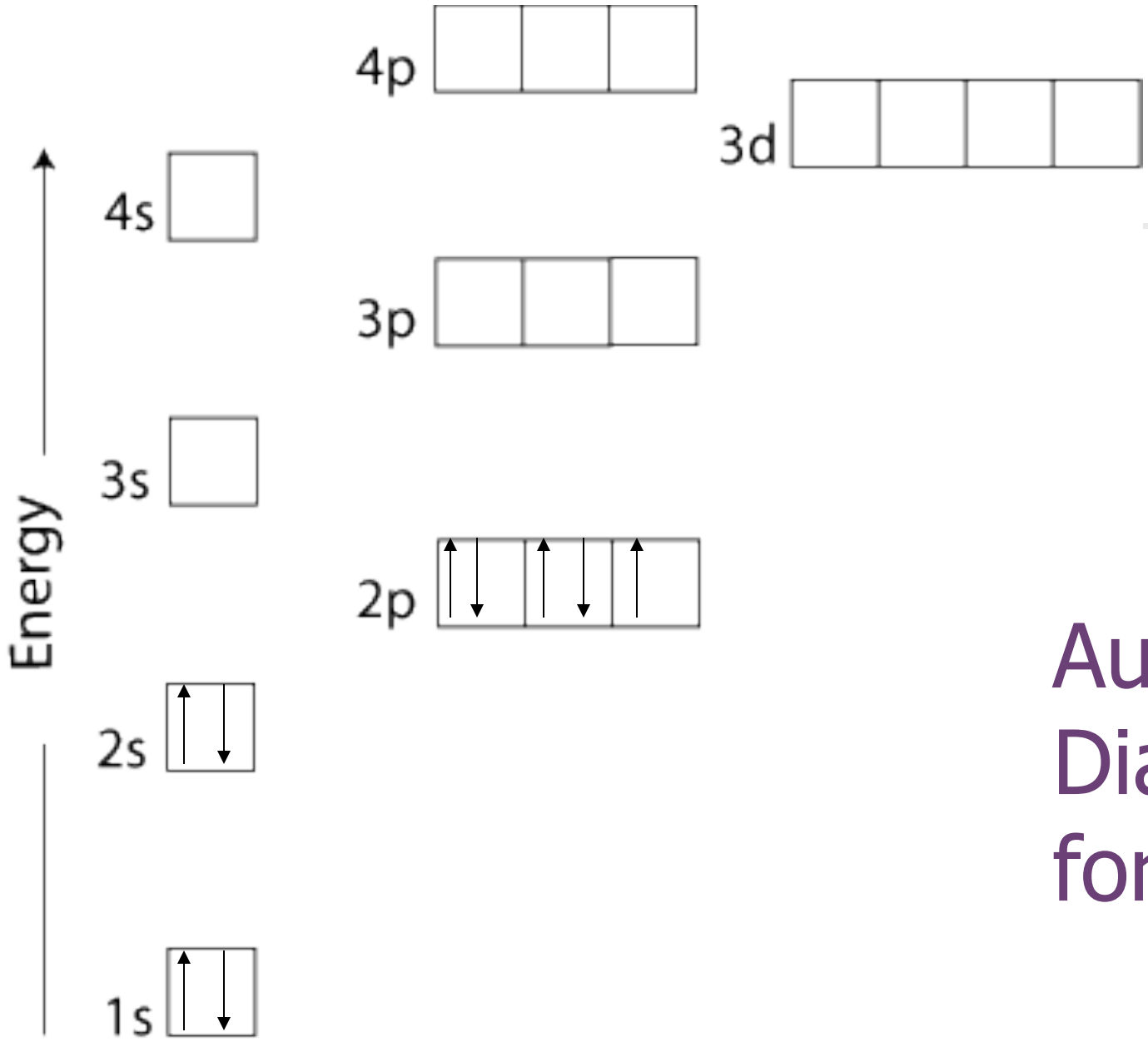
Aufbau Diagram for Boron



Aufbau Diagram for Carbon



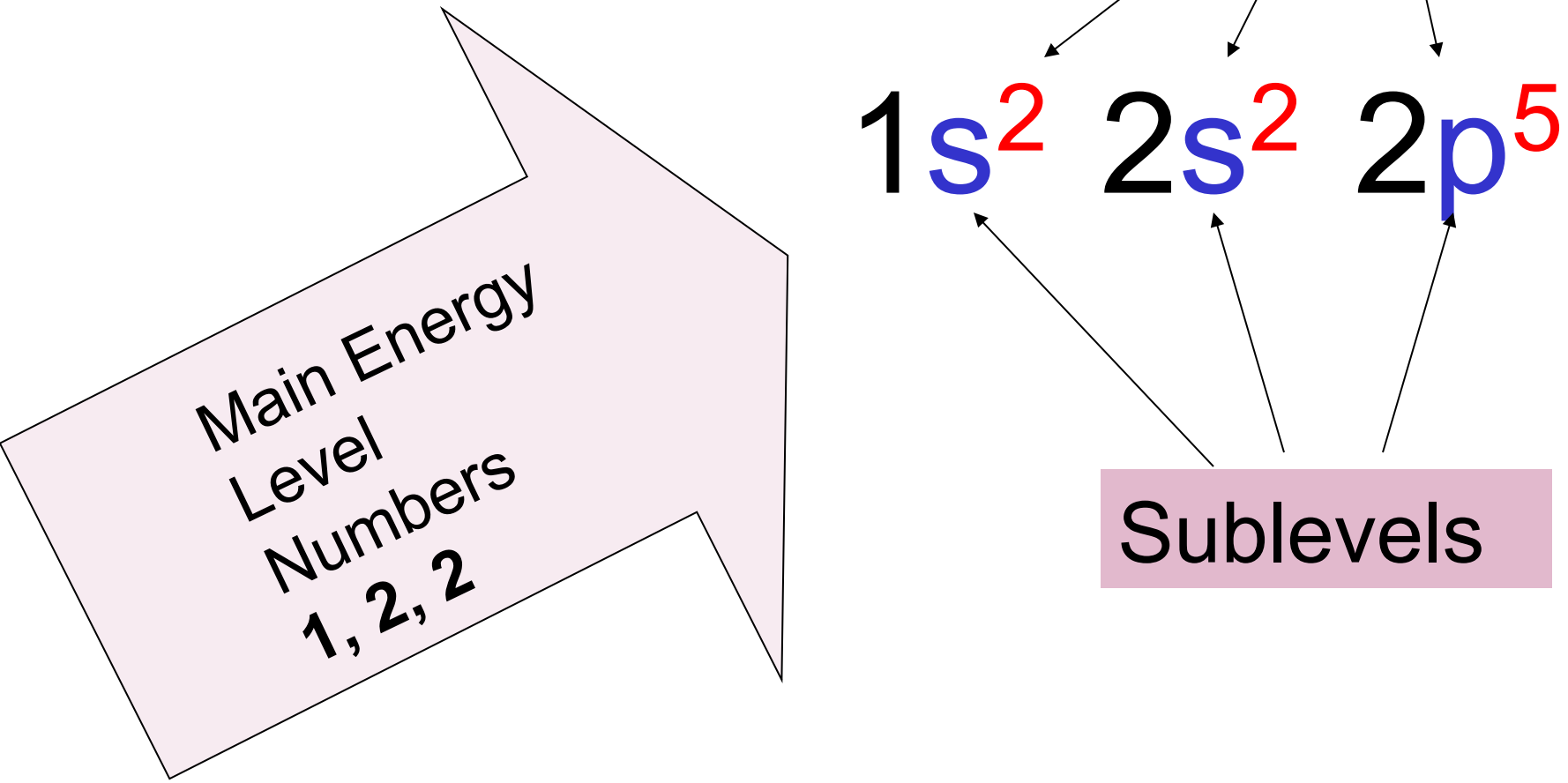
Aufbau Diagram for Nitrogen



Aufbau Diagram for Fluorine

Standard Notation of Fluorine

Number of electrons in the sub level 2,2,5



Shorthand Notation

- Use the last noble gas that is located in the periodic table right before the element. (from the end of the row above the element)
- Write the symbol of the noble gas in brackets.
- Write the remaining configuration after the brackets.
- Ex: Fluorine: [He] $2s^2$ $2p^5$

- How do you tell what is left?
- Look at the position on periodic
- Row #, 1st column fills that s orbital first
- Example:
- (long hand): K = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
- (short hand) K = $[Ar]4s^1$

More Short Hand examples

- Fe: $[Ar]4s^2 3d^6$
- Al: $[Ne]3s^2 3p^1$

Electron Configuration for Ions

- Determine the number of electrons and then write configuration as usual
- Example: F^{1-} : 10 electrons

  $1s^2 2s^2 2p^6$

  Ca^{2+} : 18 electrons

  $1s^2 2s^2 2p^6 3s^2 3p^6$