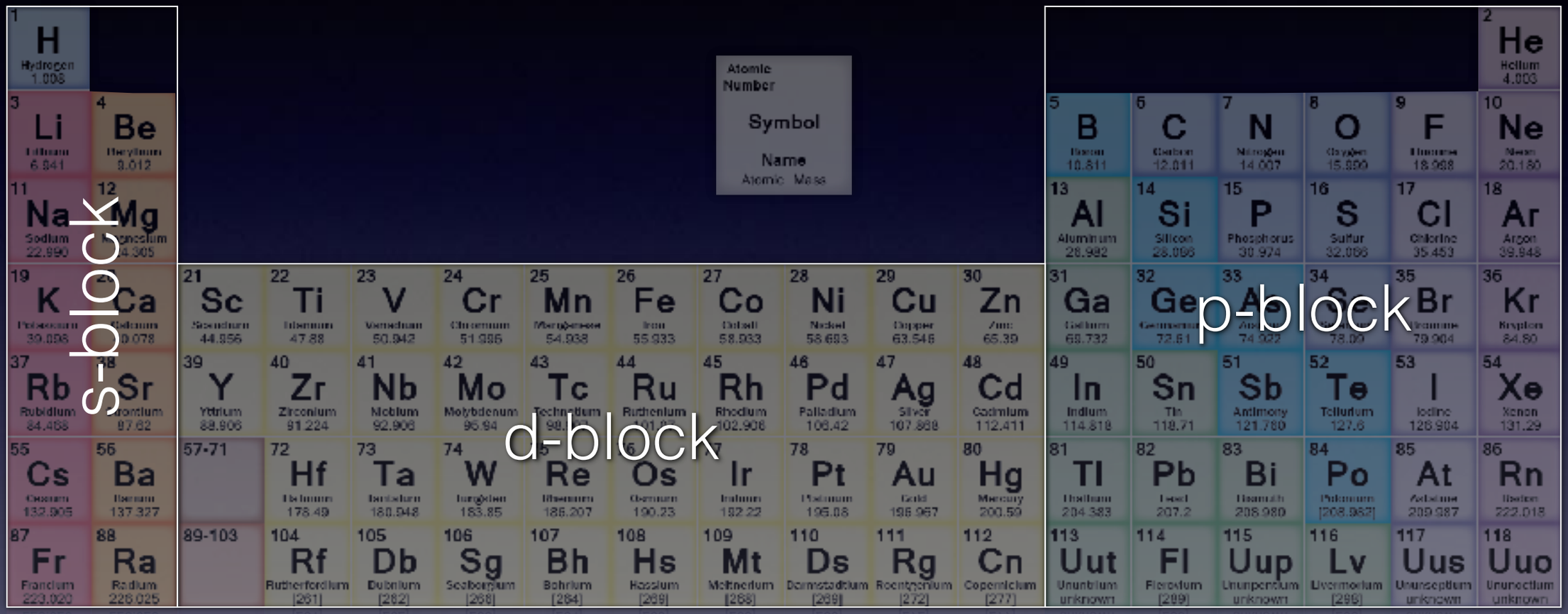
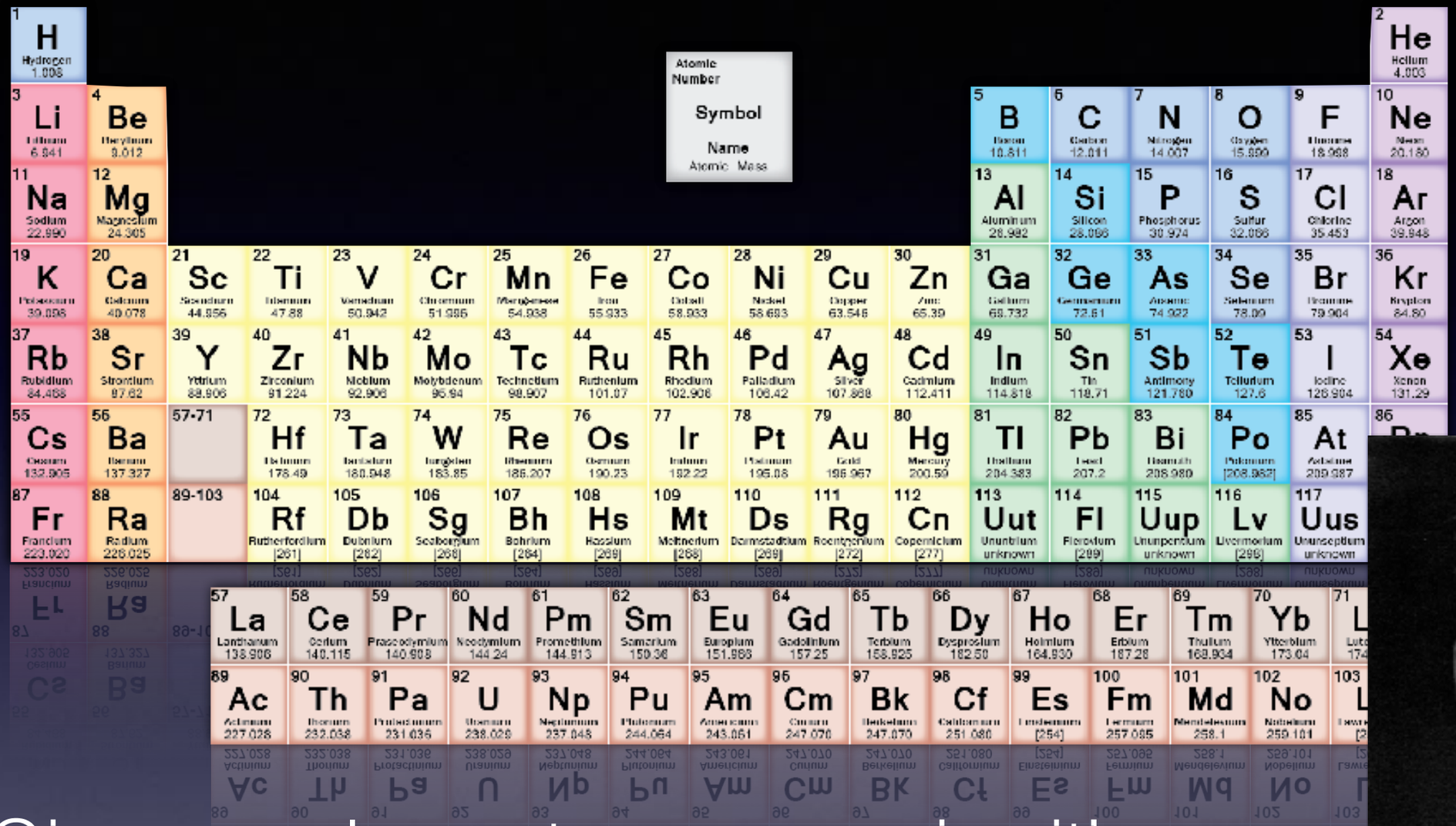
Previously in Molecularity…

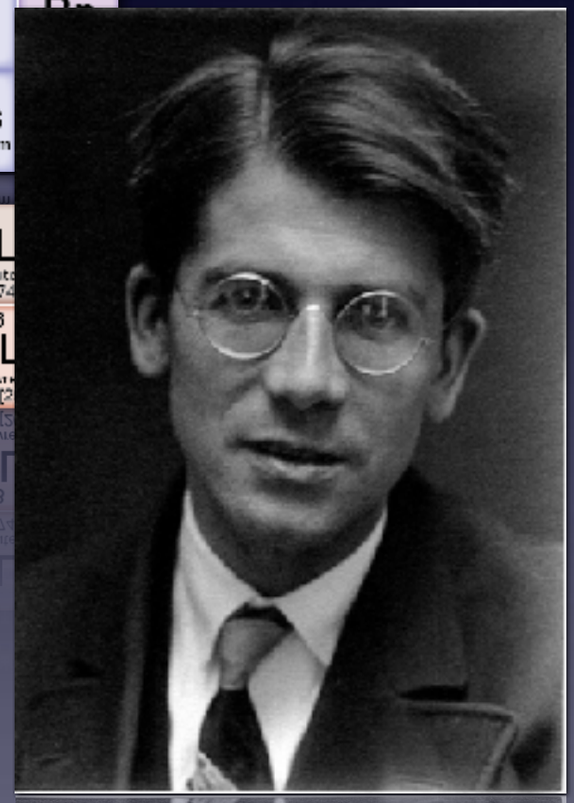
Blocks in the periodic table





- Given an element, can you give it's e^- config? (will only ask through Ba)

- Do you understand the exceptions?



Fredrich Hund

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Hund%2CFriedrich_1920er_Göttingen.jpg

Where are we going today?

Ch1010-A17-A03 Lecture 9

- §3.? Periodic trends in size
- §3.? Ionization Energy
- §3.? Electron Affinity
- §4.4 Electronegativity

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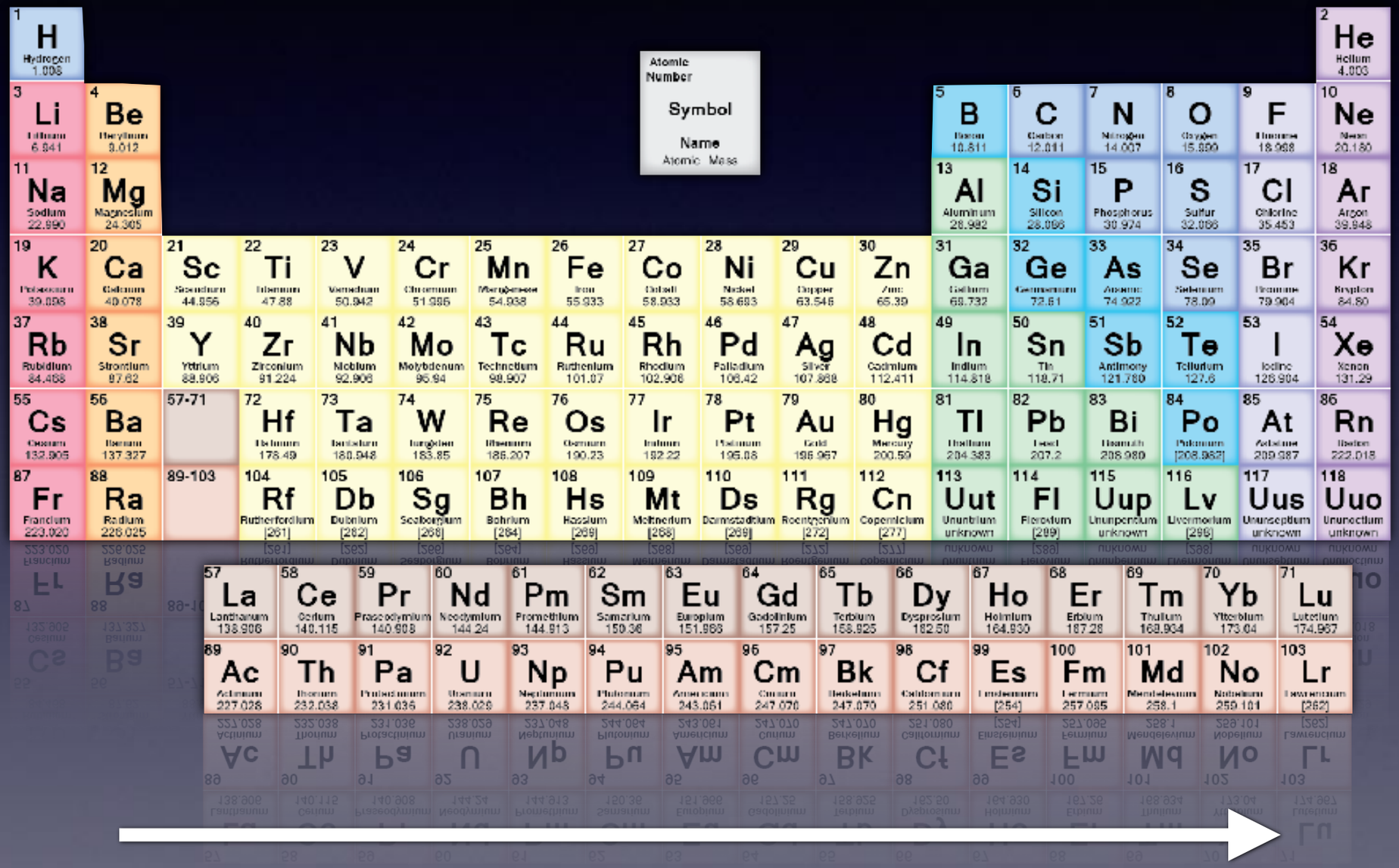
Periodic trend in size

Increasing or decreasing?



Increasing or decreasing?

1
H
Hydrogen
1.008

3
Li
Lithium
6.941

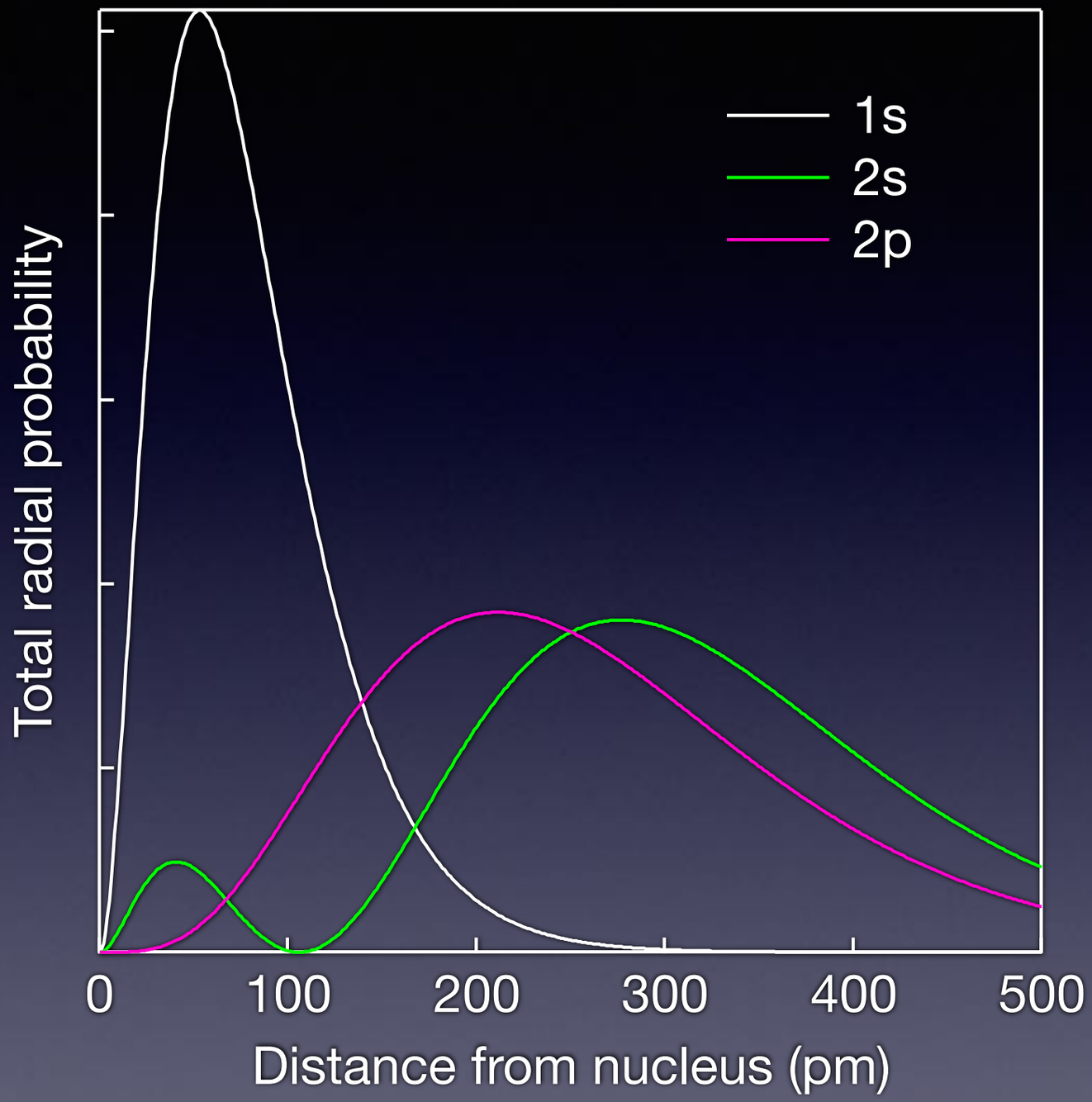
11
Na
Sodium
22.990

19
K
Potassium
39.098

37
Rb
Rubidium
84.468

55
Cs
Cesium
132.905

87
Fr
Francium
223.020



What might this tell us about atomic radius?

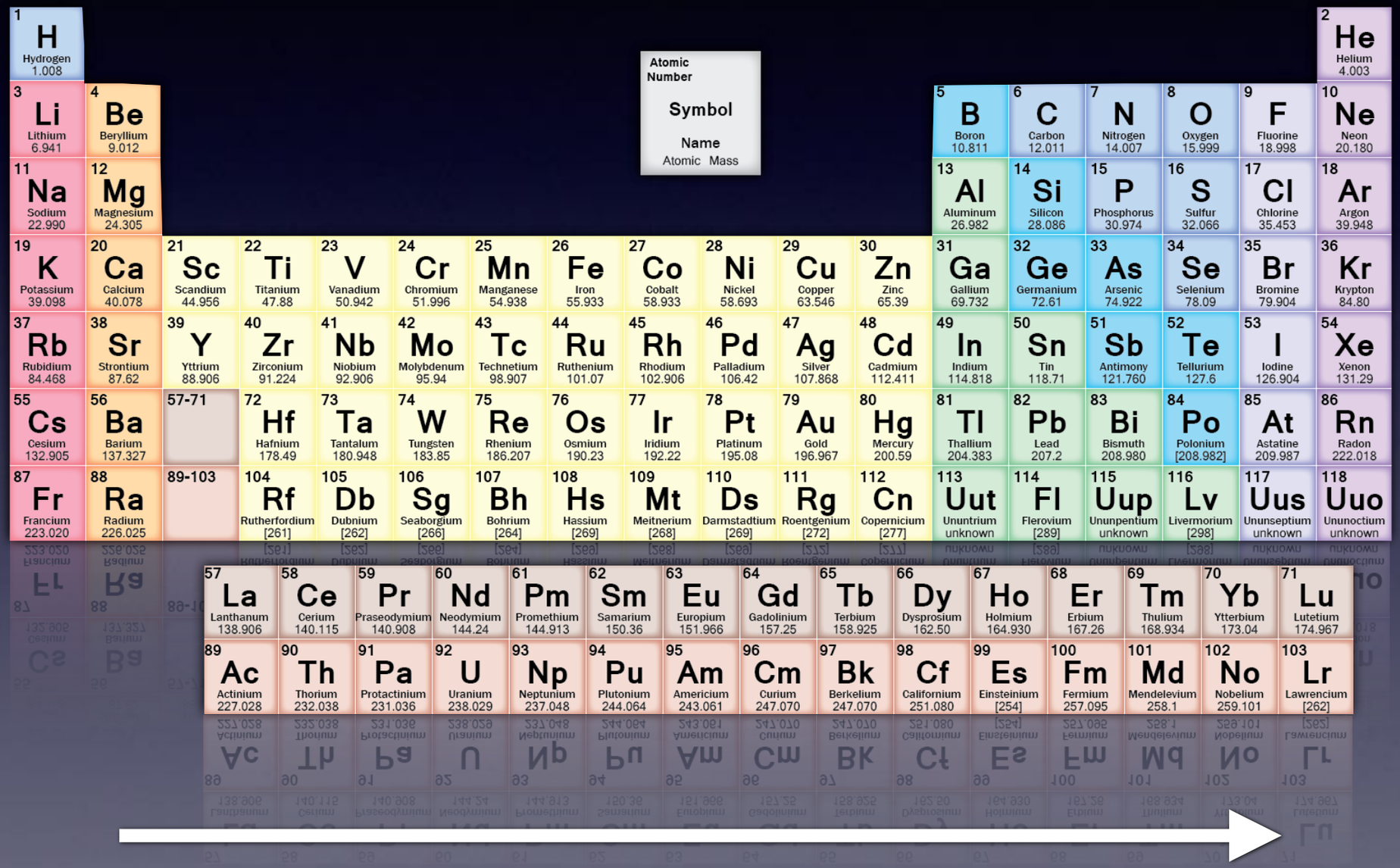
Now you try…

Order the following atoms in order of increasing atomic radius, and *briefly* explain why.

Aluminum
Boron
Gallium
Indium

Periodic trend in size

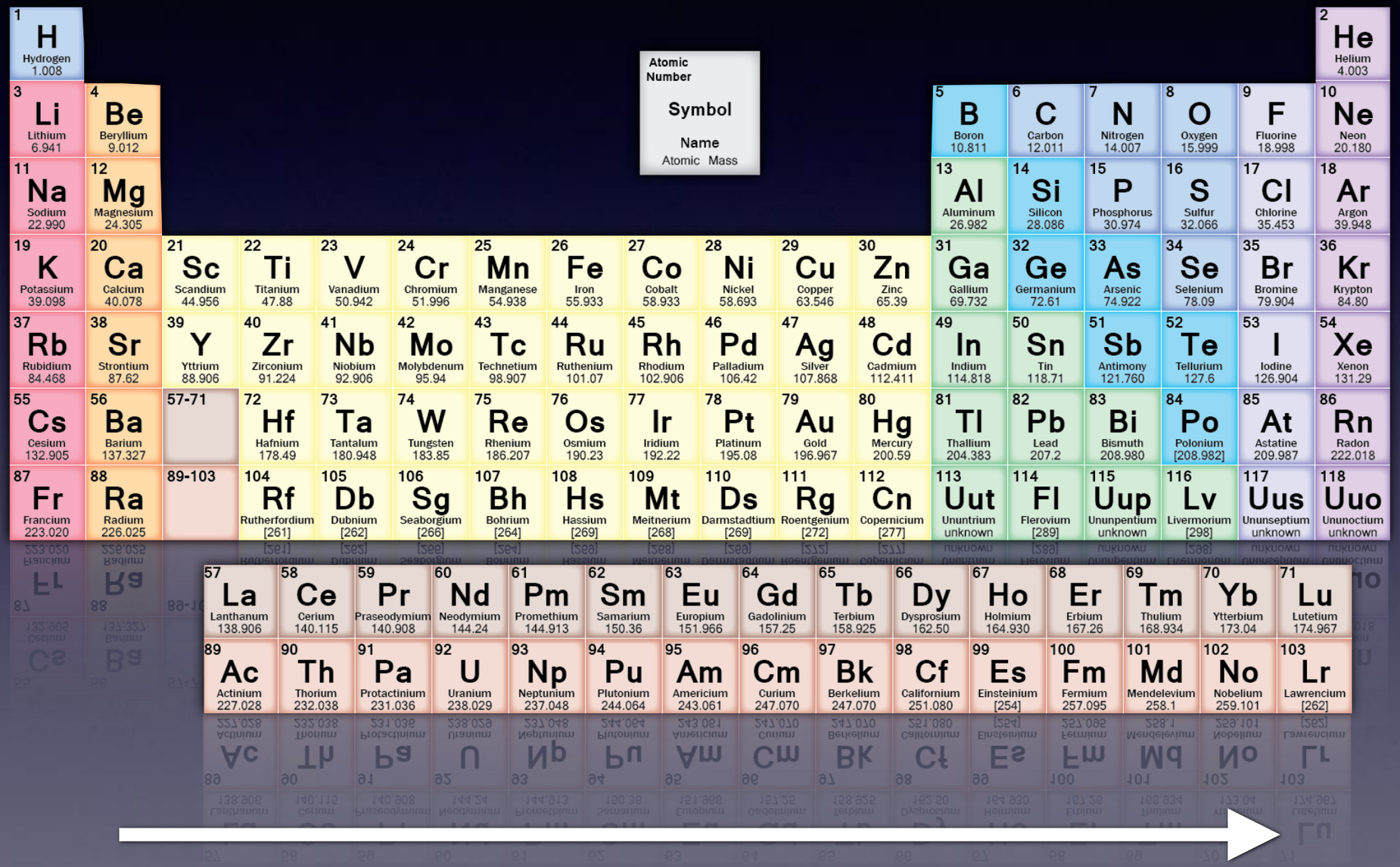
Increasing or decreasing?



Increasing or decreasing?

Periodic trend in size

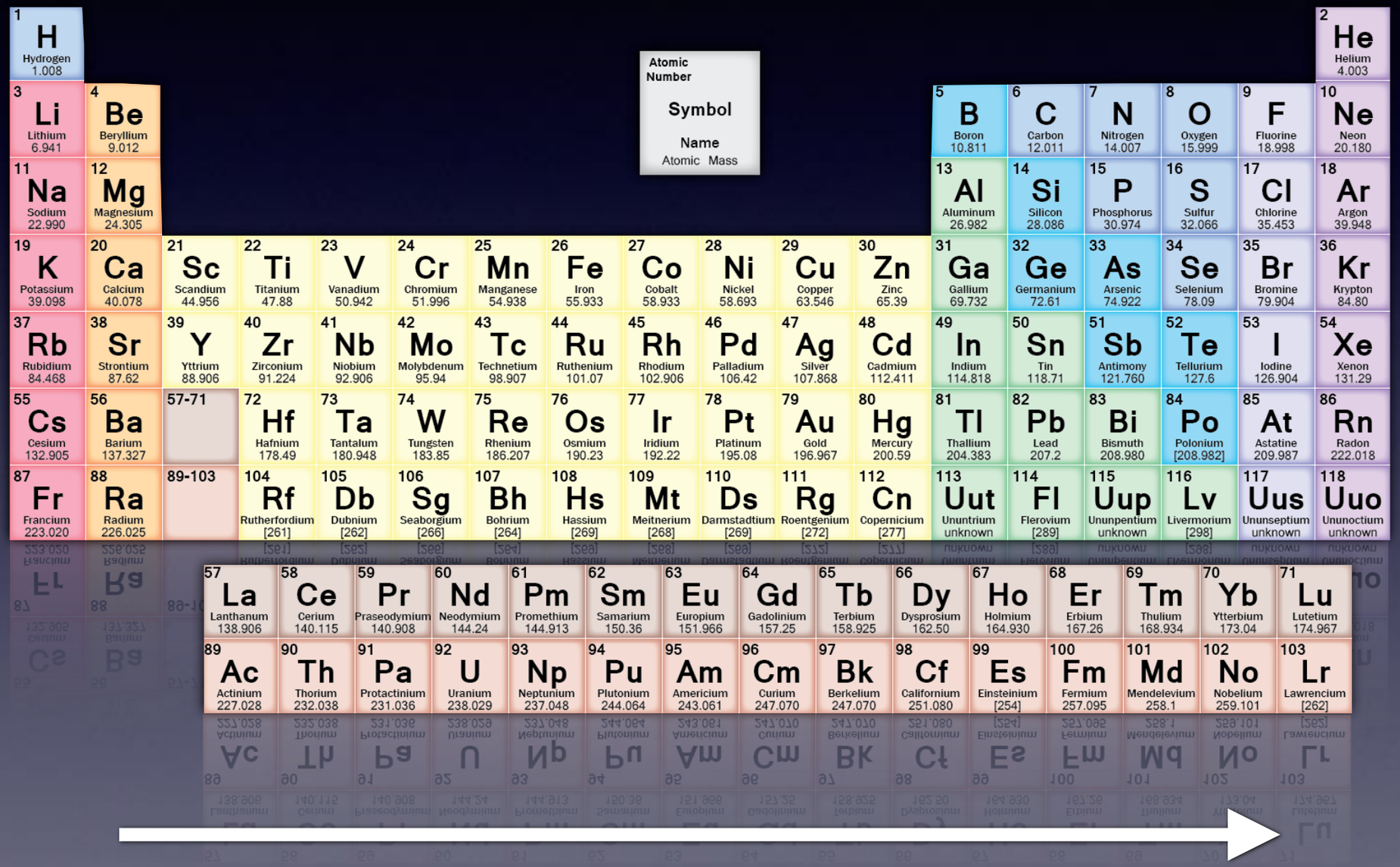
Increasing or decreasing?



Increasing or decreasing?

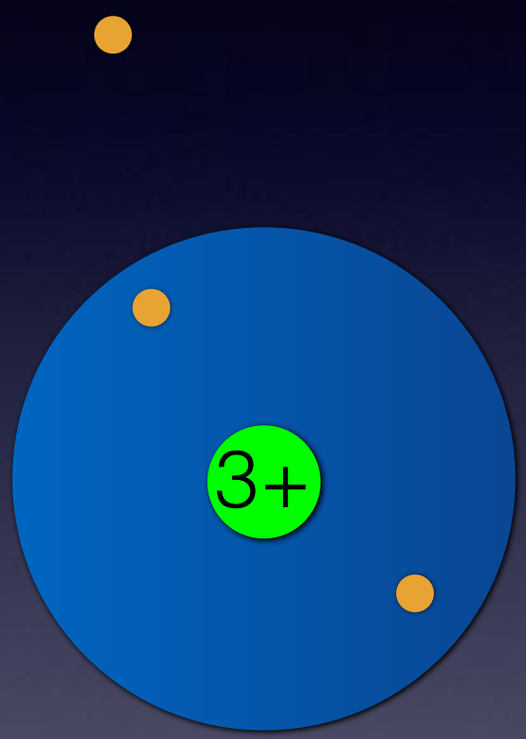
Periodic trend in size

Increasing or decreasing?

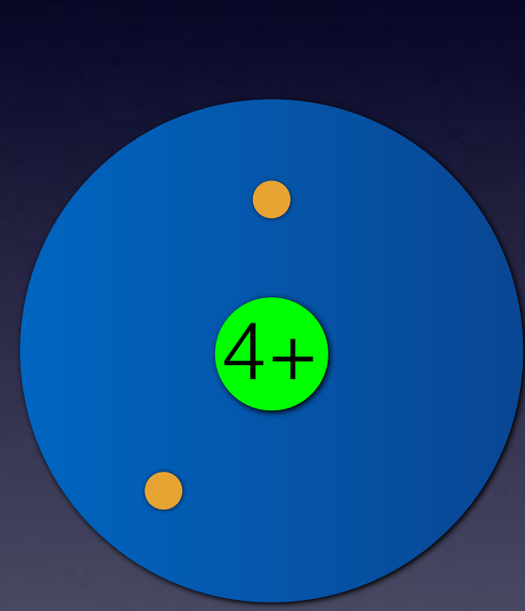


Increasing or decreasing?

Screening… consider Li vs Be

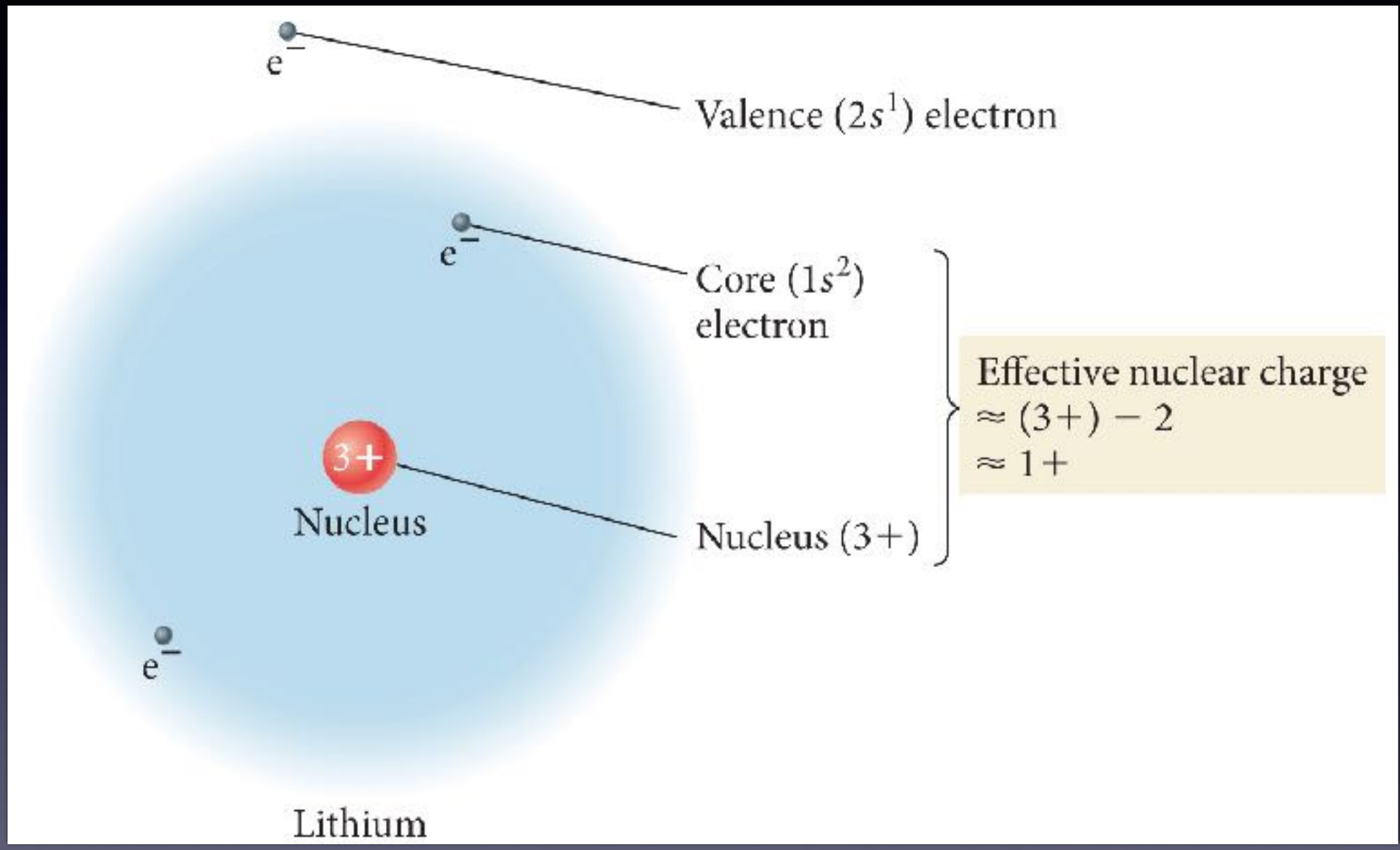


$1s^2\ 2s^1$



$1s^2\ 2s^2$

Screening and “effective” nuclear charge



$$Z_{\text{eff}} = Z - S$$

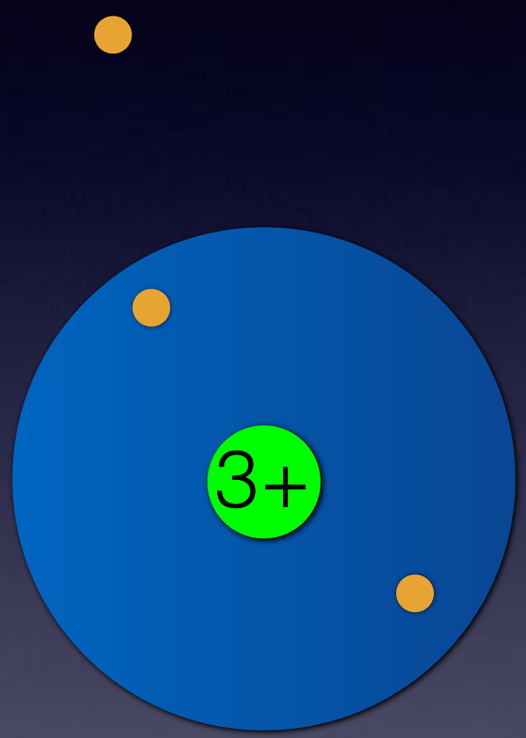
Effective nuclear charge

Actual nuclear charge

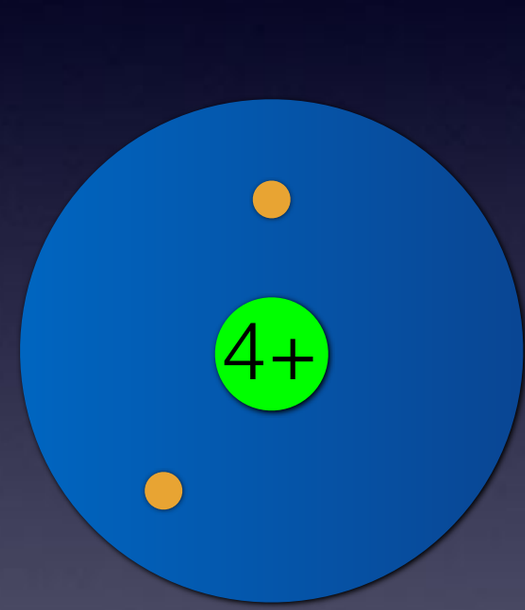
Charge that is screened

$$\mathbf{E} = \frac{1}{4\pi\epsilon_0}\frac{q_1 q_2}{r}$$

Screening… consider Li vs Be

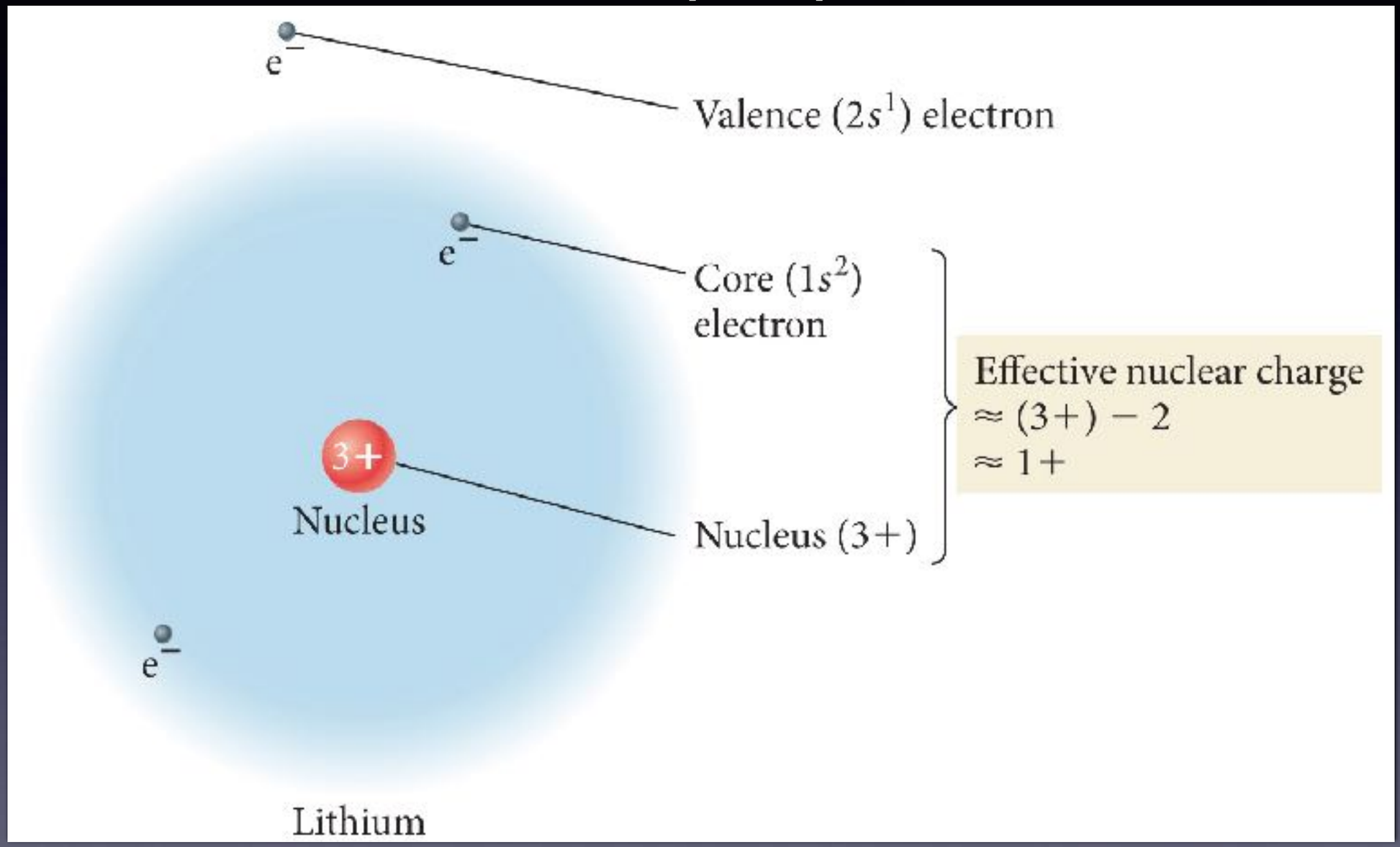


“Last” electron added feels Z_{eff} ~ 1



“Last” electron added feels Z_{eff} ~ 2

Minute paper…



Consider the *n* = 2 block (Li, Be, B, C, N, O, F, Ne) 1 atom at a time…
Does adding 1 electron and 1 proton make an atom larger or smaller?

Minute paper…

Consider the $n = 2$ block (Li, Be, B, C, N, O, F, Ne) 1 atom at a time…
Does adding 1 electron and 1 proton make an atom larger or smaller?

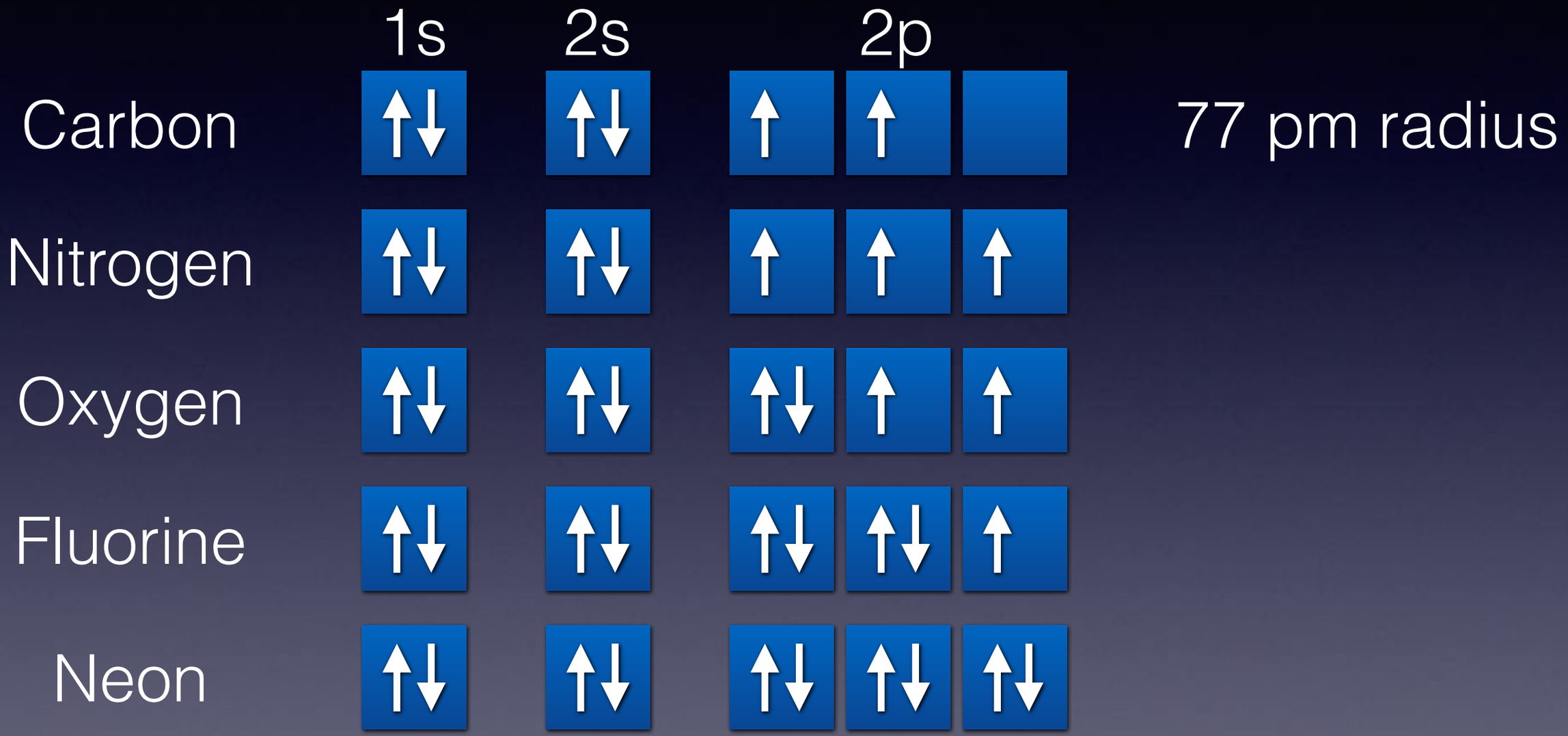
Smaller.

Why? Adding 1 electron and 1 proton increases Z by 1 and Z_{eff} by *almost* 1.

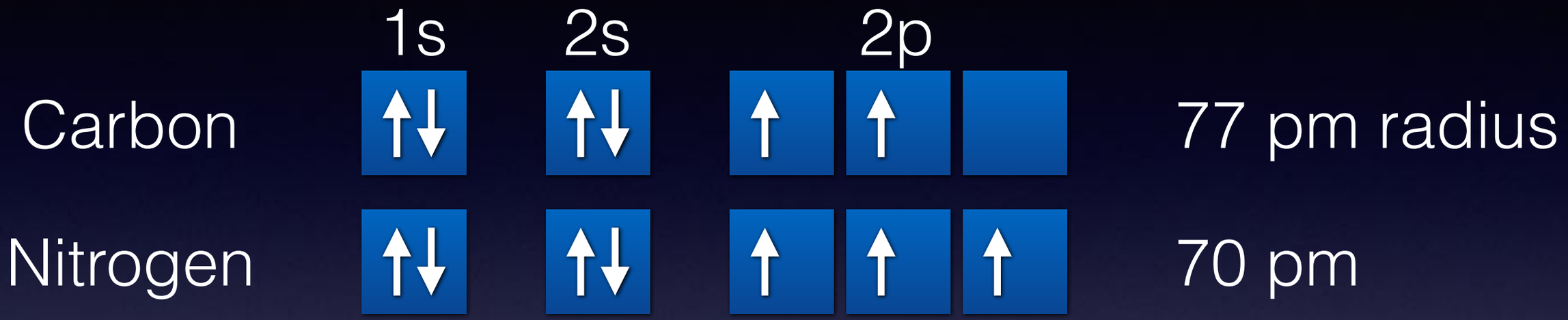
$$Z_{\text{eff}} = Z - S$$

$$\mathbf{E} = \frac{1}{4\pi\epsilon_0}\frac{q_1 q_2}{r}$$

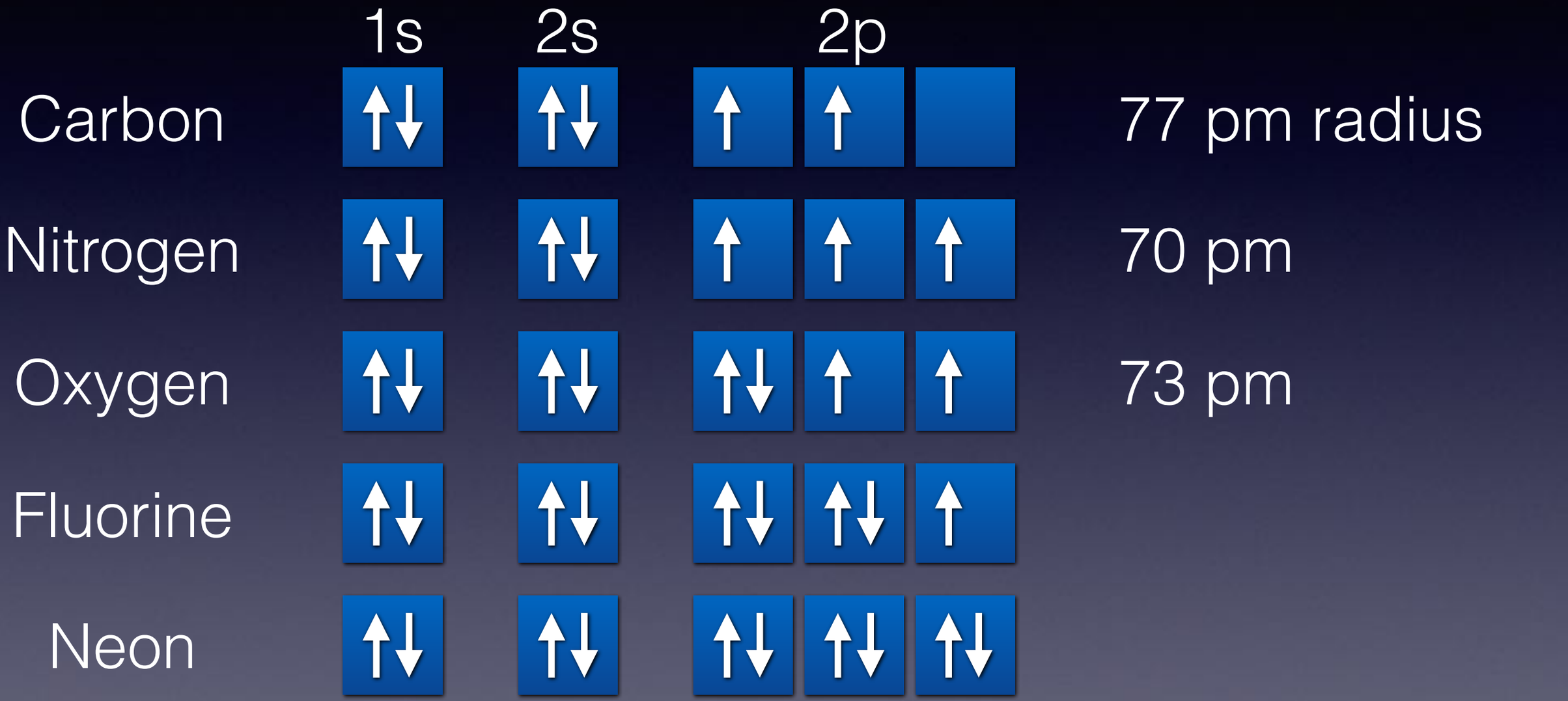
Shielding and atomic radius



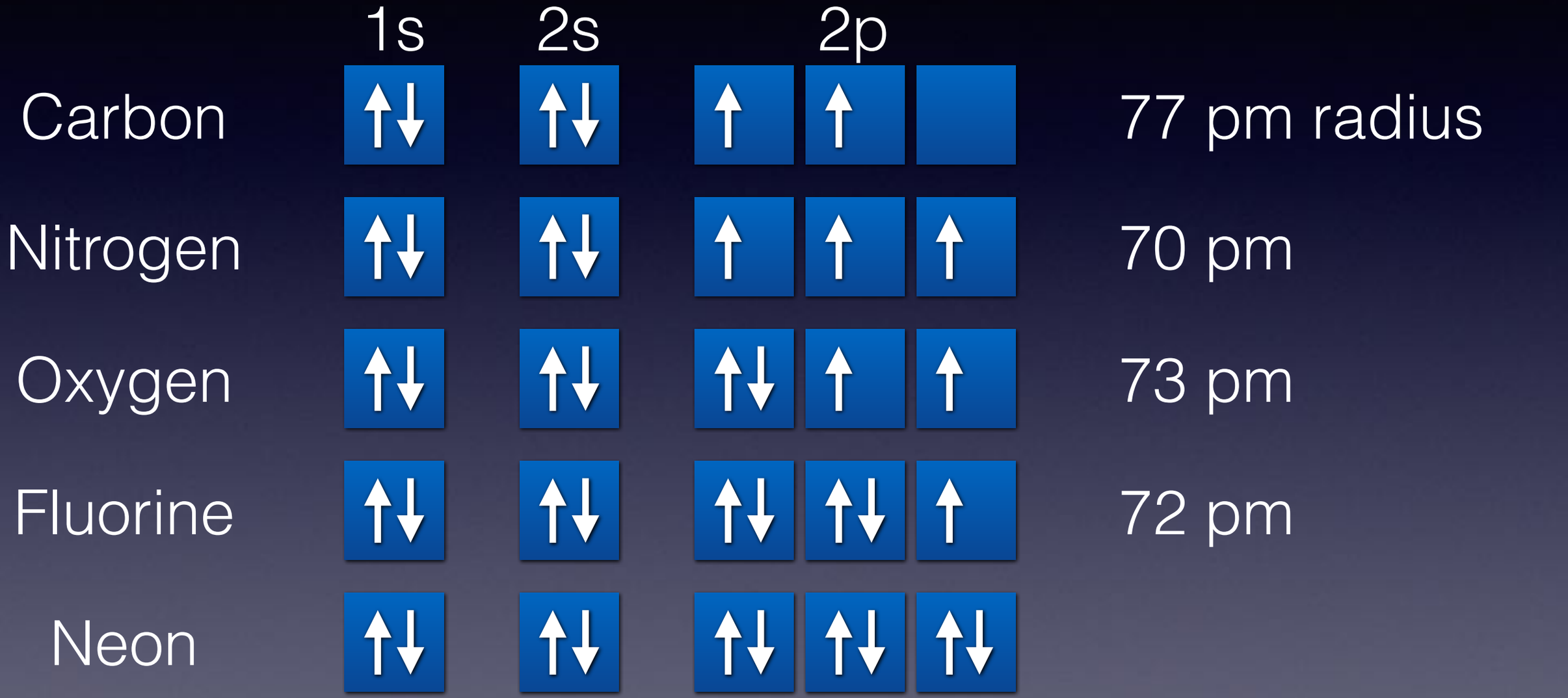
Shielding and atomic radius



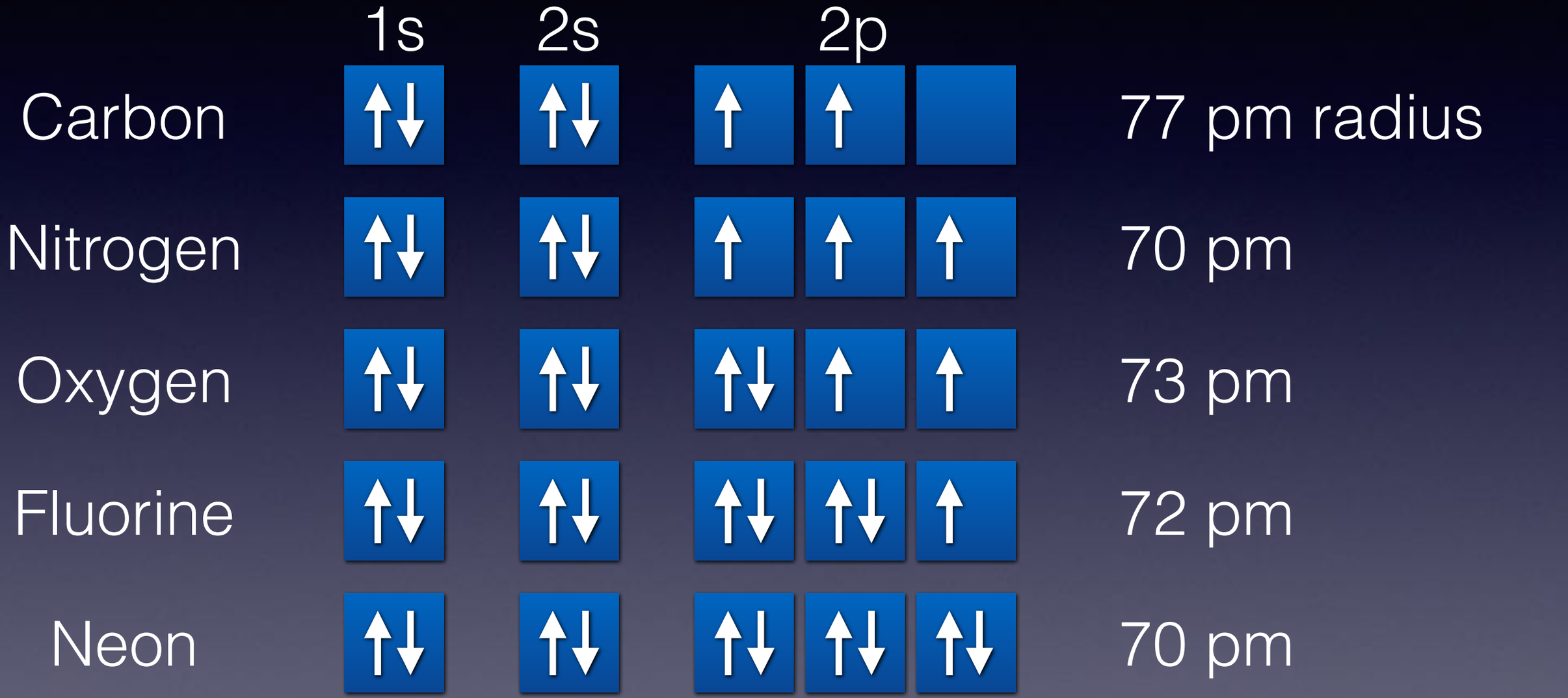
Shielding and atomic radius



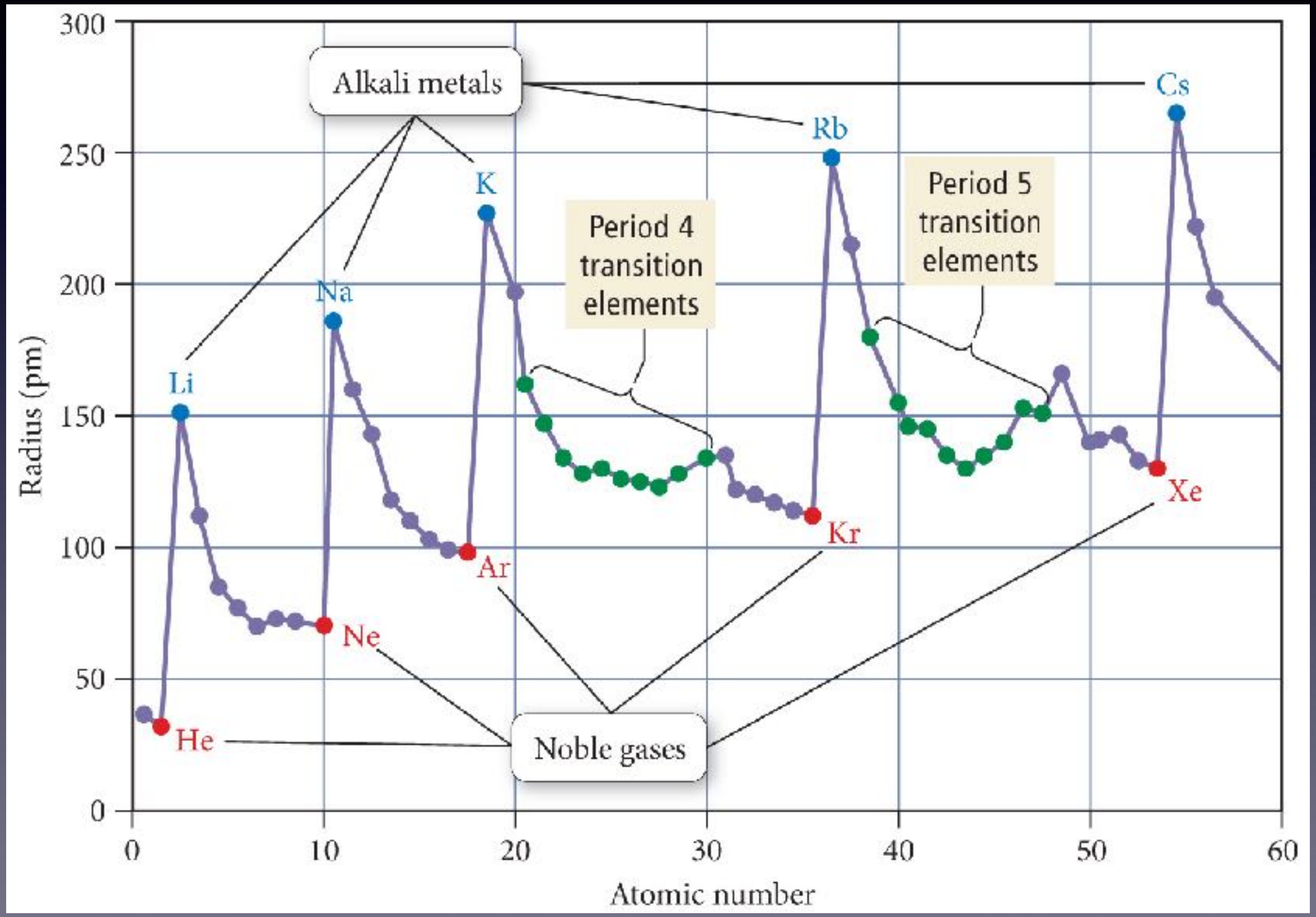
Shielding and atomic radius



Shielding and atomic radius



Periodic trends in atomic radius



Tro
Fig. 8.7

Where did we go today?

Ch1010-A17-A03 Lecture 9

- §3.6 Periodic trends in size

Next time…

- §3.7 Ionization Energy
- §3.8 Electron Affinity
- §4.4 Electronegativity

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