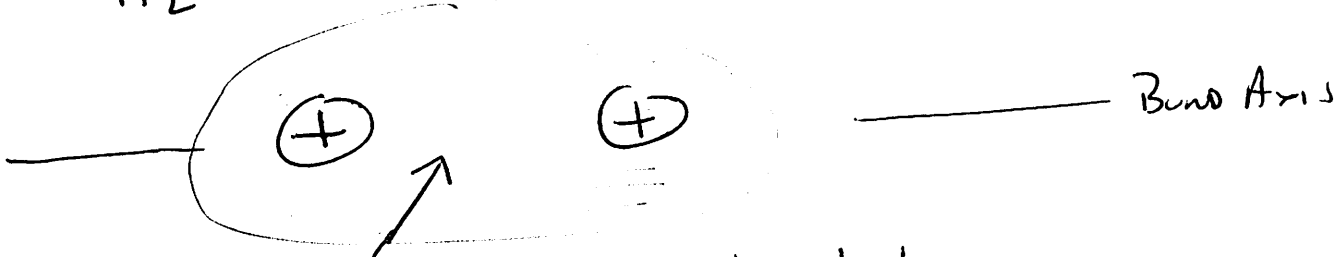
Molecular Orbitals

- quantum mechanical model of bonding
- an MO belongs to a molecule as a whole
- 2 electrons are required to fill a MO (just like atomic orbitals)
- the # of atomic orbitals equals the # of molecular orbitals
- A **bonding orbital** is a MO that can be occupied by 2 electrons of a covalent bond.

Sigma Bonds (σ)

- MO that is symmetrical around the axis connecting two atomic nuclei
- constructive interference of the atomic orbitals (waves)
- H_2 is example (the "s" orbitals)



the electron density between the nuclei is high

→ A stable diatomic molecule of H_2, with a SIGMA BOND, results when the balance of all interactions between the hydrogen atoms [remember the VIDEO] is tipped in favor of holding the ATOMS together

★ Atomic "p" orbitals can also overlap to form MO's

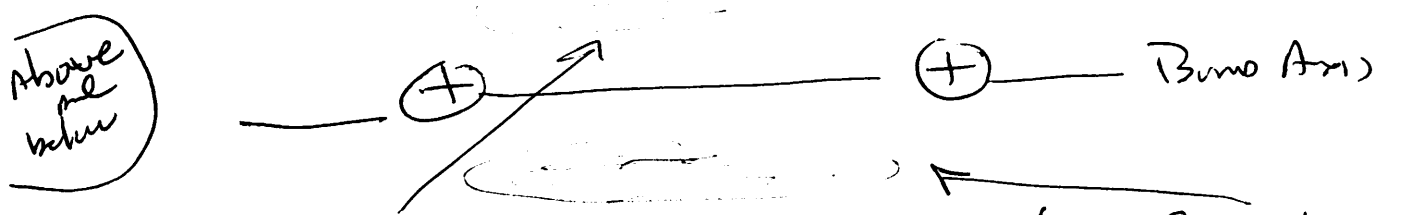
→ F_2 molecule is an example

→ the overlap of the "p's" occurs around the bond AXIS connecting the nuclei so it is also a SIGMA BOND

NOTE: SIGMA does NOT mean "s" overlap and PI does NOT mean "p" overlap

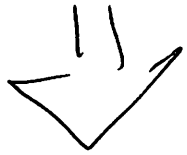
Misconception ALERT!!

PI BONDS (π) - the side by SIDE overlap of atomic "p" orbitals



★ bonding electrons most likely to be found here

★ Atomic orbitals overlap less than in SIGMA BONDING



therefore . . .

Pi (π) BONDS ARE WEAKER than SIGMA (σ) BONDS