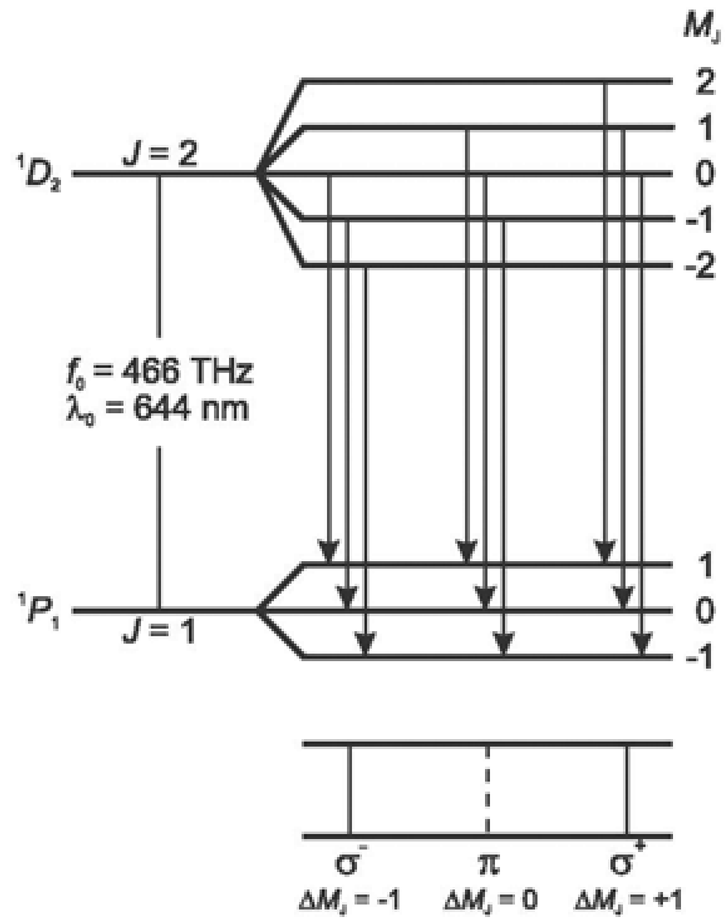
3. Zeeman Effect Background Correction:

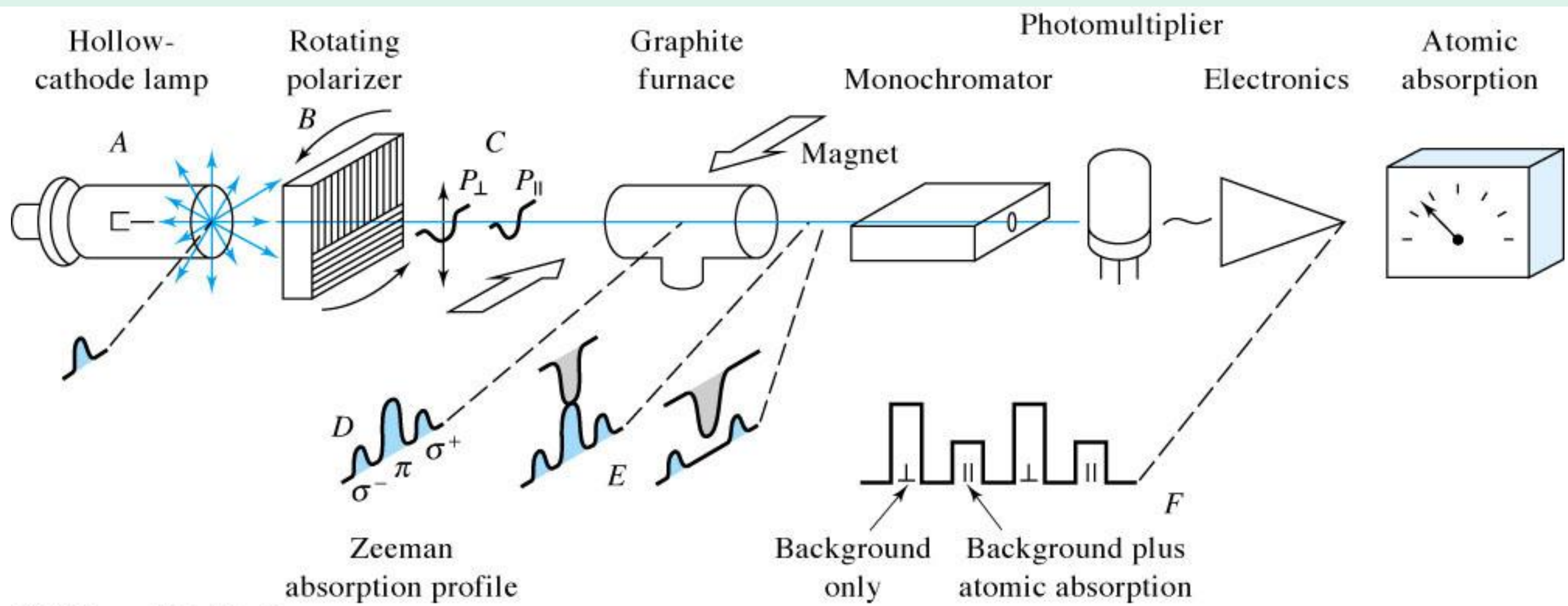
- When an atomic vapor is exposed to a strong magnetic field (10 kG), a splitting of electronic energy levels of the atoms takes place that leads to formation of several absorption lines for each electronic transition.
- These lines are separated from one another by about 0,01 nm, with the sum of the absorbances for the lines being exactly equal to that of the original line from which they were formed.
- Several splitting patterns arise depending on the type of electronic transition that is involved in the absorption process. The simplest splitting pattern, which is observed with singlet transitions, leads to a central, π line and two equally spaced satellite σ *lines, The central π line, which is at the original wavelength,* has an absorbance that is twice that of each σ *line,*



Level splitting and transitions of the normal Zeeman effect in Cadmium

3. Zeeman Effect Background Correction:

• Application of the Zeeman effect to atomic absorption instruments is based on the differing response of the two types of absorption lines to polarized radiation,
• Unpolarized radiation from an ordinary hollow-cathode source *A* is passed through a rotating polarizer *B, which separates the* beam into two components that are plane-polarized at 90° to one another C.
•These beams pass into a graphite furnace. A permanent 11-kG magnet surrounds the furnace and splits the energy levels into the three absorption peaks shown in *D.*
-The π *line absorbs* only that radiation that is *polarized in a direction parallel to the external magnetic field;*
- The σ *lines, in contrast, absorb only radiation polarized at 90° to the field*.

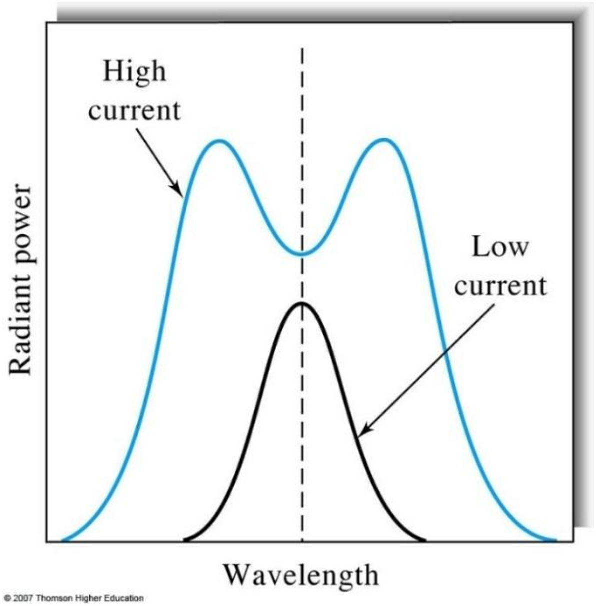


3. Zeeman Effect Background Correction:

- A second type of Zeeman effect instrument has been designed in which a magnet surrounds the hollow-cathode source. Here, it is the emission spectrum of the source that is split rather than the absorption spectrum of the sample.
- This instrument configuration provides an analogous correction.

✓ Zeeman effect instruments provide a more accurate correction for background than the other methods.
✓ Complex and expensive
✓ These instruments are particularly useful for electrothermal atomizers and permit the direct determination of elements in samples such as urine and blood.
✓The decomposition of organic material in these samples leads to large background corrections and, as a result susceptible to significant error.

4. BG Correction Based on Source Self-Reversal



- also called the Smith-Hieftje BG correction
- is based on *the self-reversal or self-absorption behavior of radiation emitted from HCL* when they are operated *at high currents*.
- High currents produce large concentrations of non-excited atoms, which are capable of absorbing the radiation produced from the excited species.
- An additional effect of high currents is to significantly broaden the emission line of the excited species. The net effect is to produce a line that has a minimum in its center, which corresponds exactly in wavelength to that of the absorption peak

- Alignment is simple,
- One source HCL used⇒ inexpensive
-works at all wavelengths
- be used with any atomizer

- To obtain corrected absorbances, the lamp is programmed to run alternately at low (6-20 mA) and high currents (100-500mA).
- *The total absorbance (analyte+BG)* is obtained during the *low current* operation and the *background absorbance* is provided by measurements during the high current operation ofr the HCL.