



# HESEB End Station Design

**Dr. Mustafa Fatih Genişel**

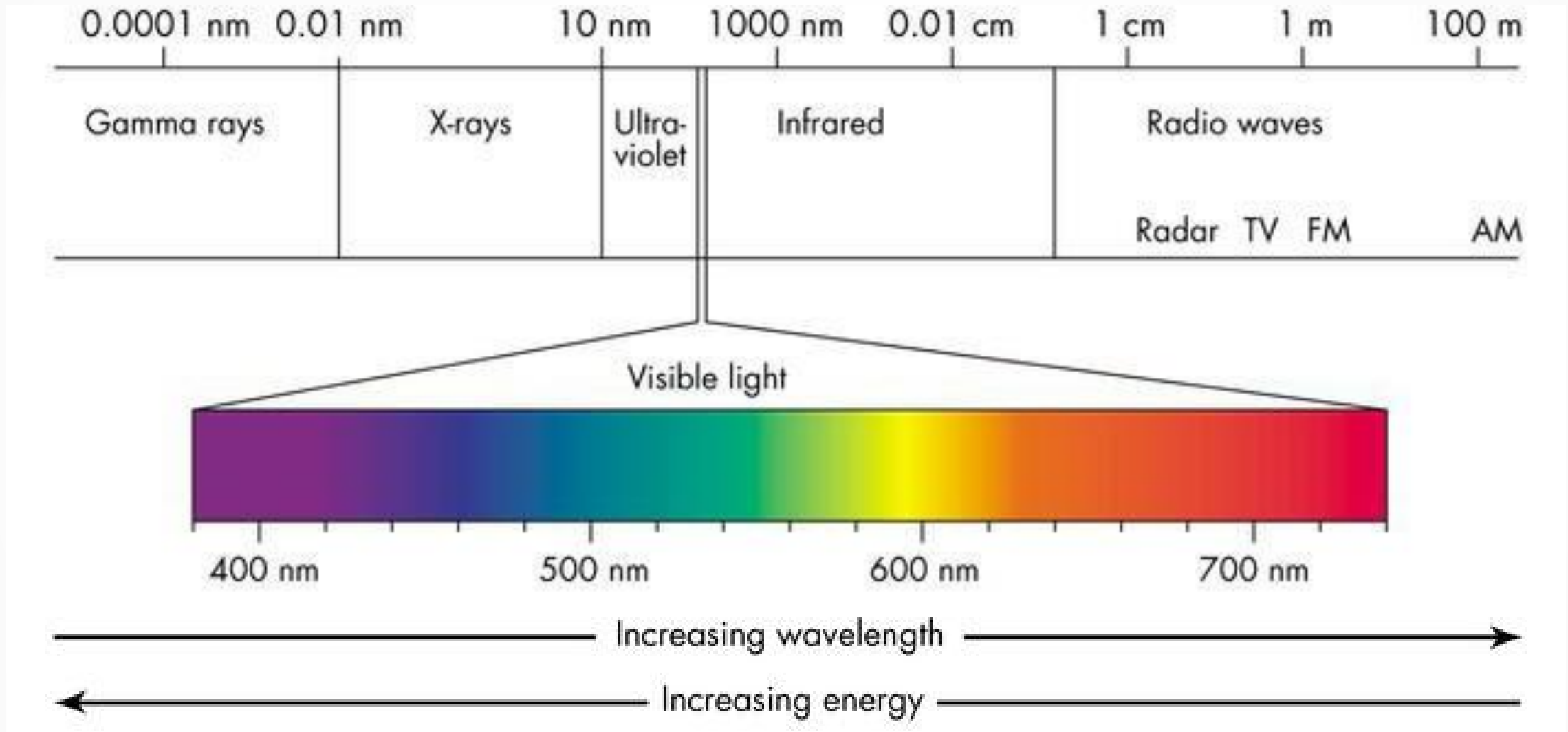
**[mustafa.genisel@sesame.org.jo](mailto:mustafa.genisel@sesame.org.jo)**

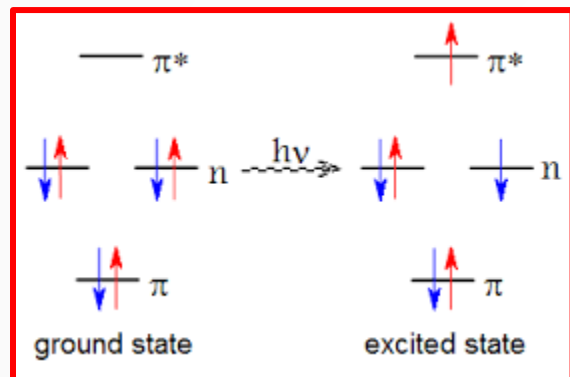


# Outline of The Presentation

- Soft X Ray- Matter Interaction
  - Full Spectrum and X Ray
  - X ray Matter interaction
  - X Ray Absorption Spectroscopy
- HESEB End Station; up to date
- TXPES End Station; up to date

# Electromagnetic Spectrum

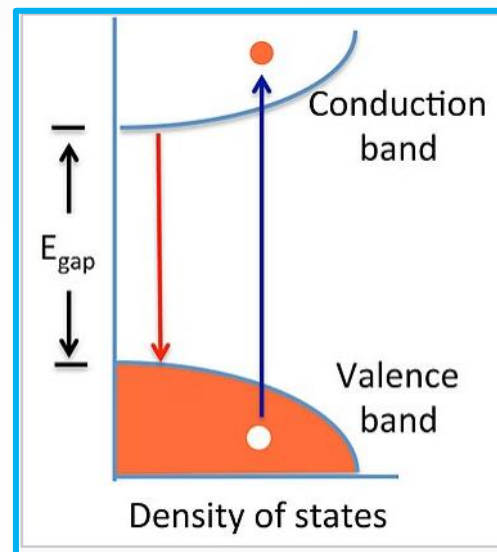




**In Molecules;  
HOMO - LUMO  
Transition**

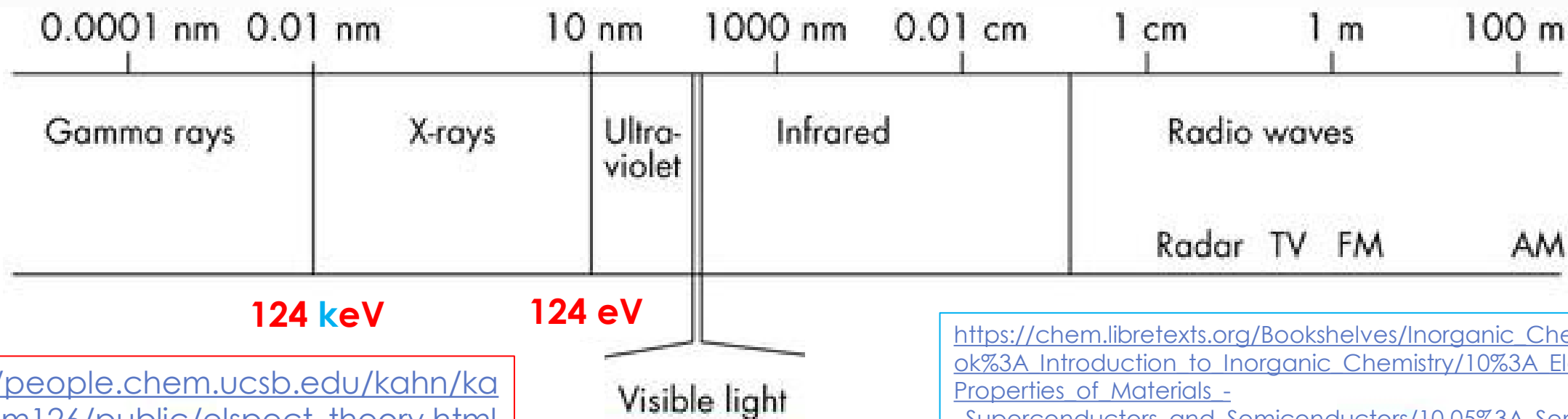
**In Solids;  
Valance Band –  
Conduction Band  
Transition**

**Electronic  
Configuration of  
Valance Electron**



**Electronic  
Configuration  
Of Core Electron**

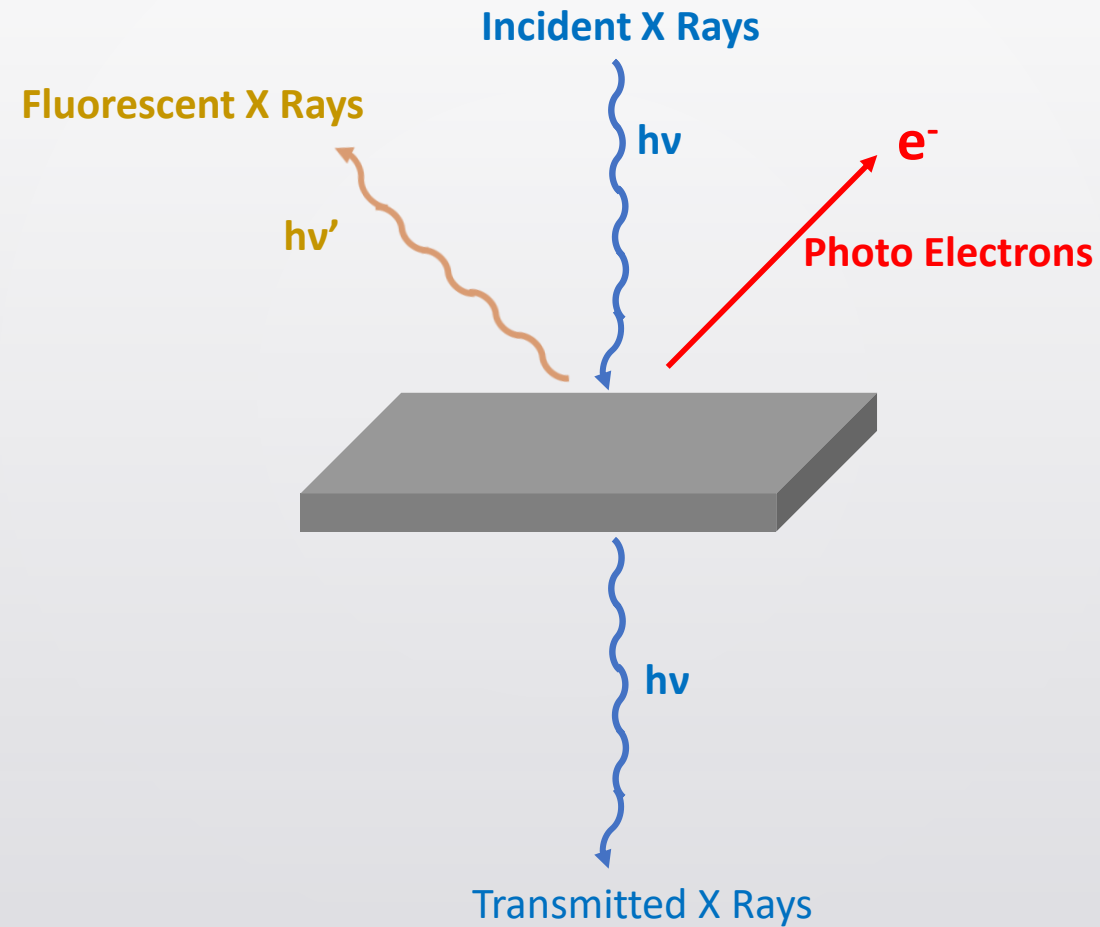
**Vibrational Rotational  
Motion Motion**



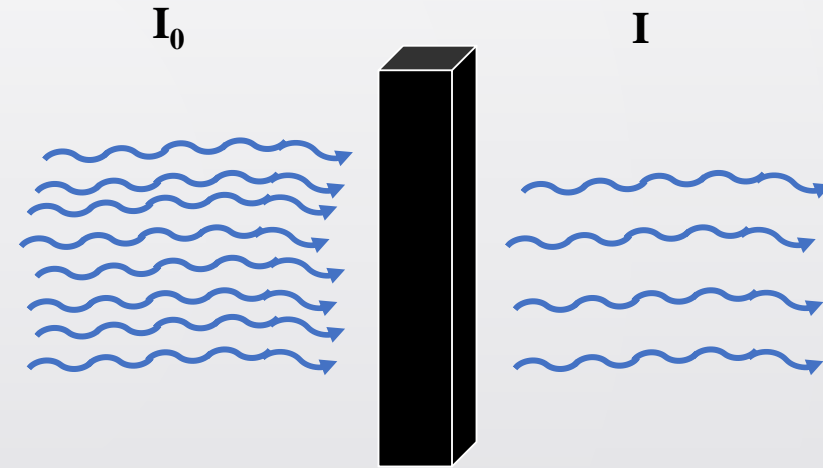
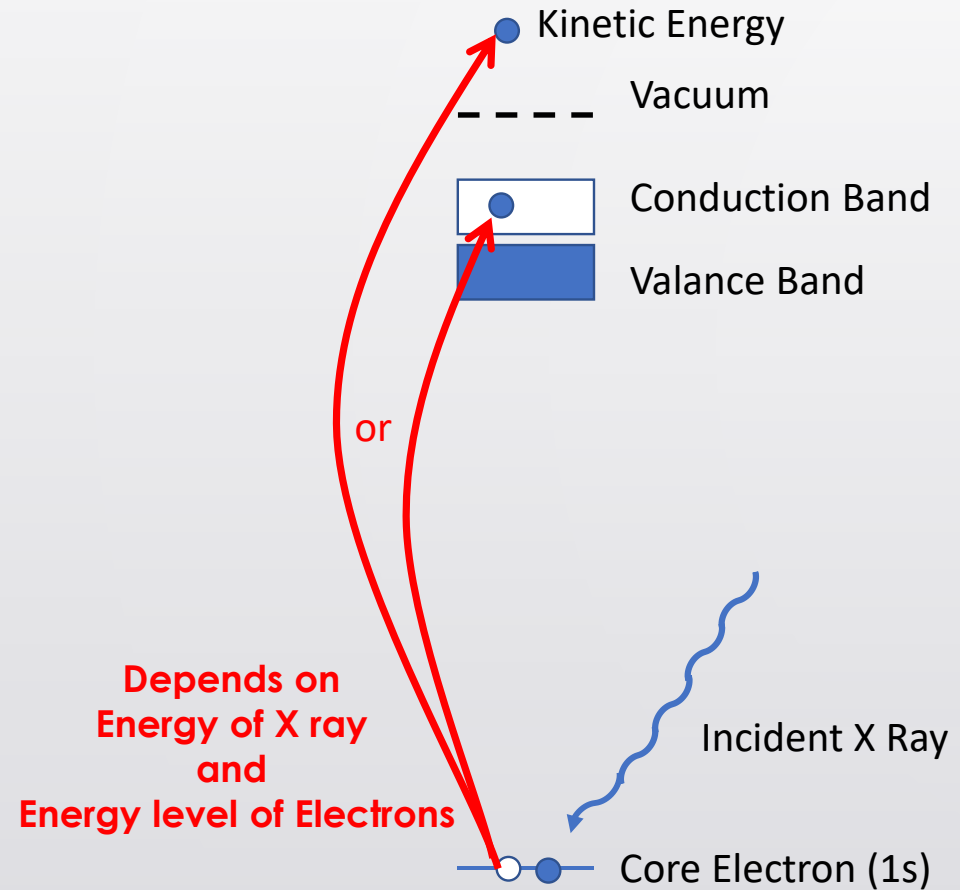
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[https://chem.libretexts.org/Bookshelves/Inorganic\\_Chemistry/Book%3A Introduction to Inorganic Chemistry/10%3A Electronic Properties of Materials - Superconductors and Semiconductors/10.05%3A Semiconductors- Band Gaps%2C Colors%2C Conductivity and Doping](https://chem.libretexts.org/Bookshelves/Inorganic_Chemistry/Book%3A_Introduction_to_Inorganic_Chemistry/10%3A_Electronic_Properties_of_Materials_-_Superconductors_and_Semiconductors/10.05%3A_Semiconductors-Band_Gaps%2C_Colors%2C_Conductivity_and_Doping)

# Interaction of X Ray and Matter



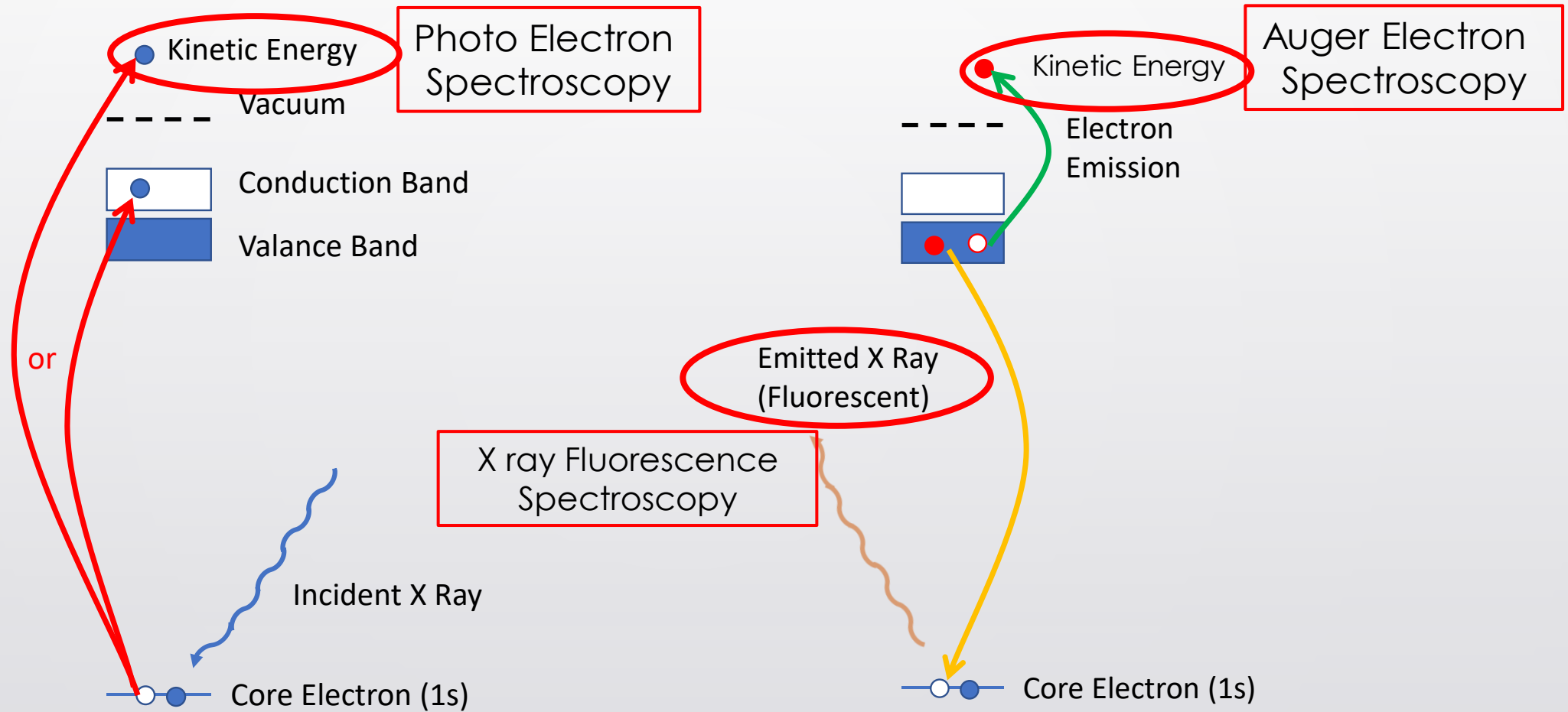
# Soft X Ray – Matter Interaction and X ray Absorption Spectroscopy



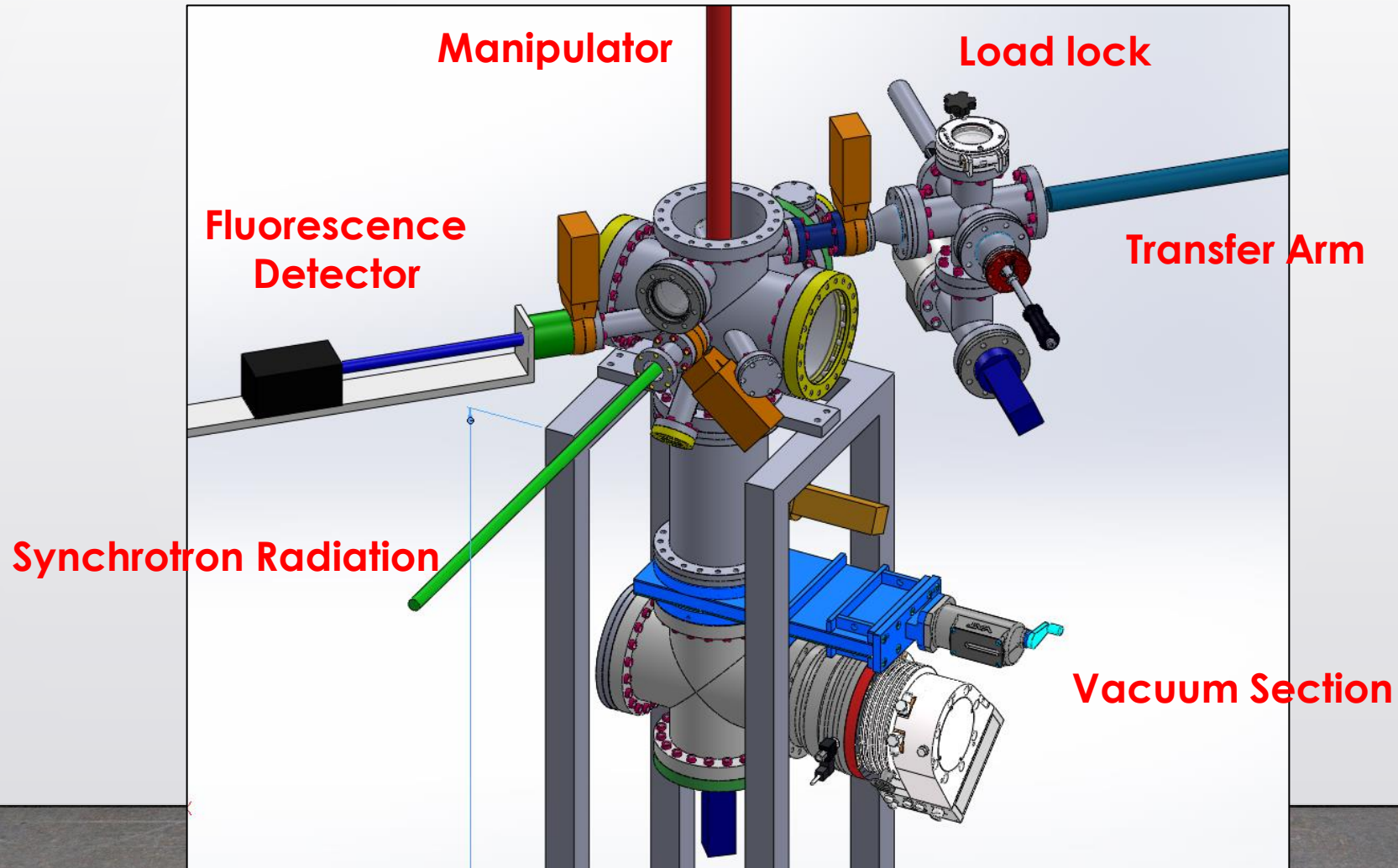
**But Soft X Rays interact strongly with matter in order to obtain  $I$ , Sample must be extremely thin. Sub micrometer range**



# X Ray Absorption Related Spectroscopies



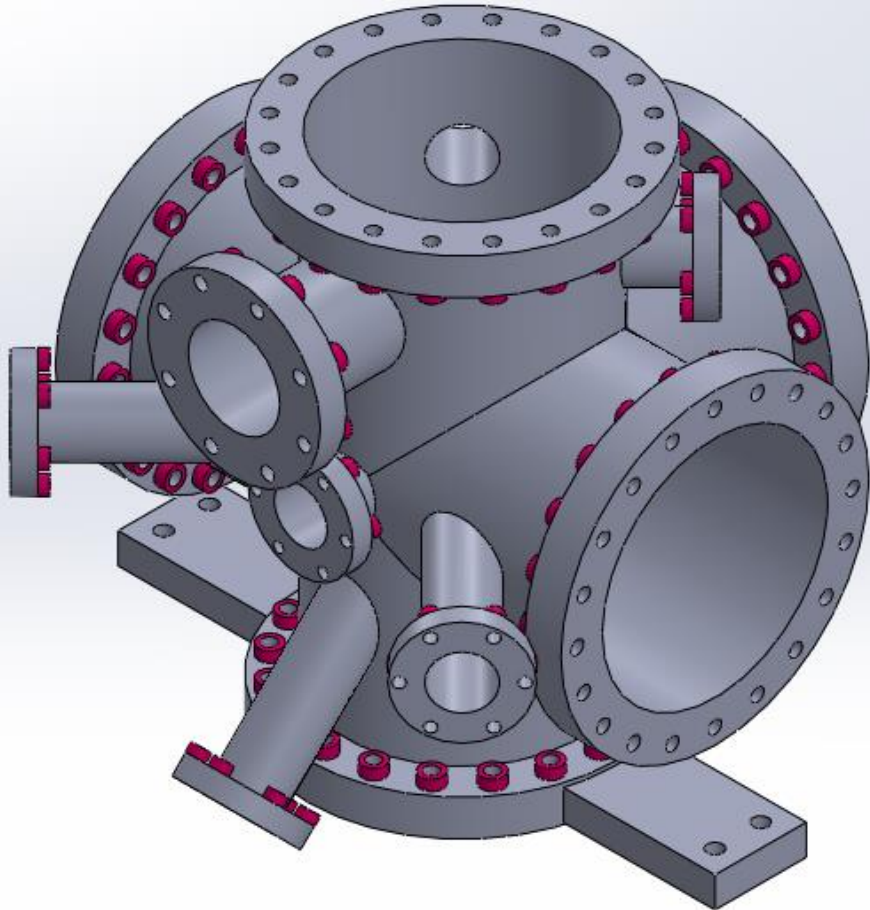
# HESEB End Station; Preliminary Design



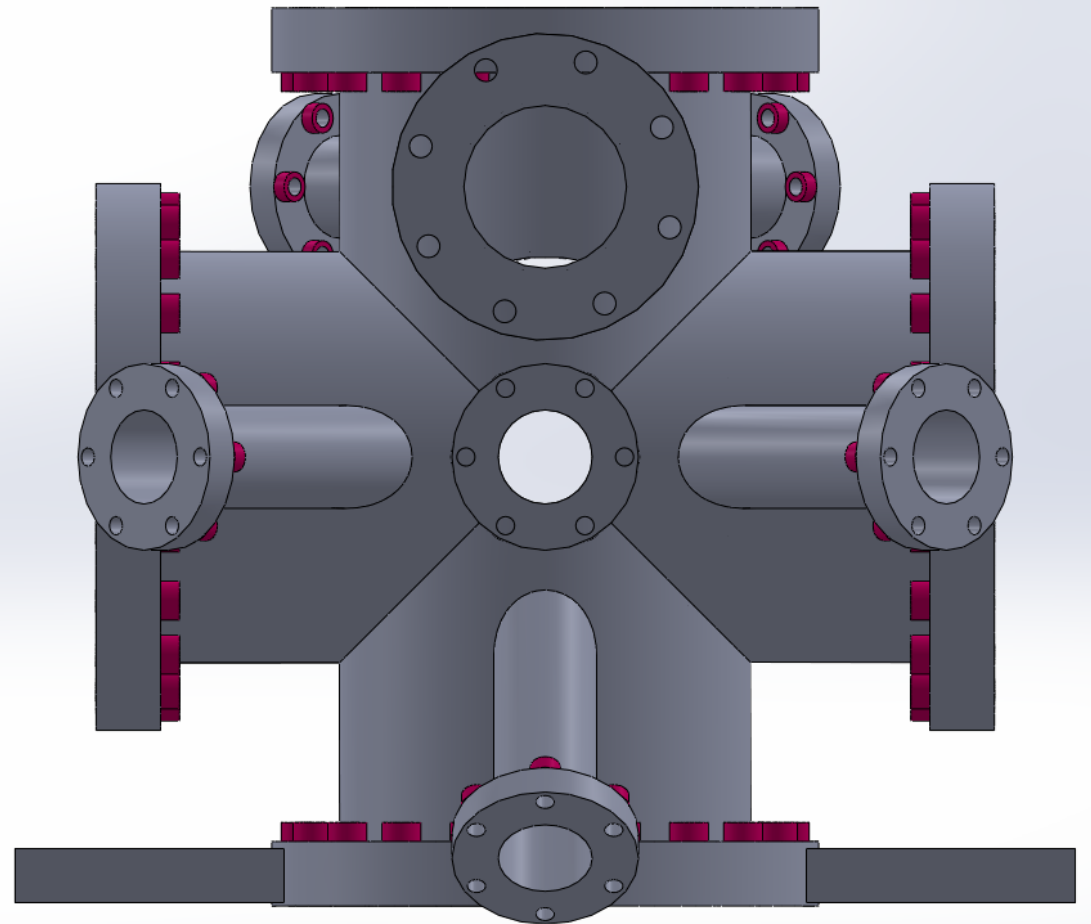


# HESEB Experimental Chamber Final Design

Isometric View



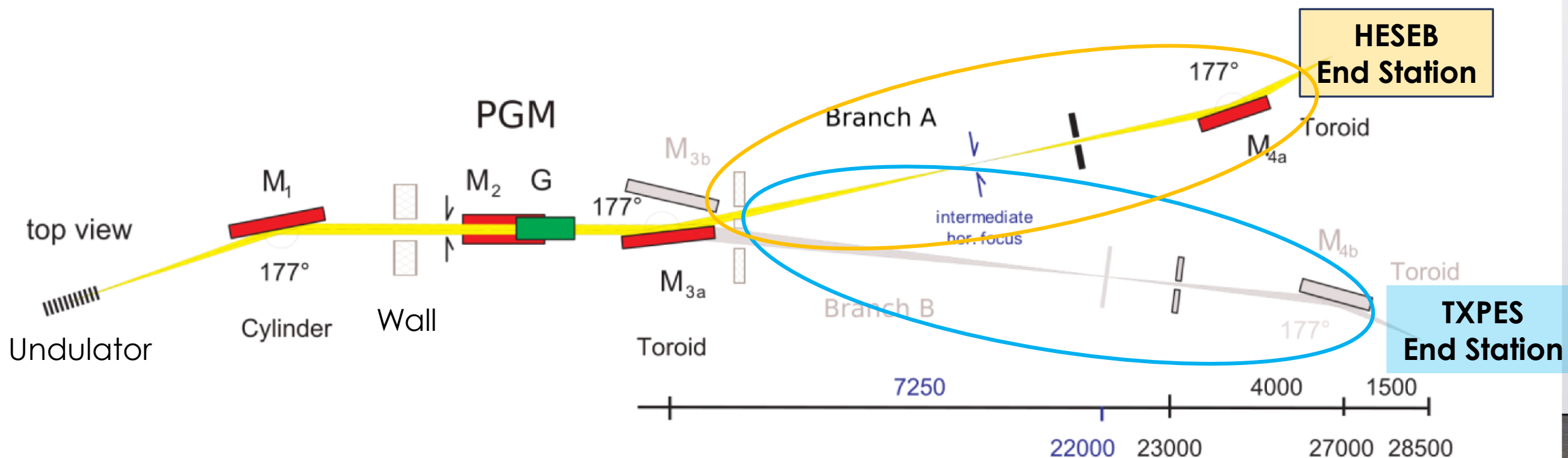
Front View



# Plan View of HESEB and TXPES

Inside the Synchrotron  
Tunnel


Experimental Hall





# Turkish Soft **X**-ray **P**hotoelectron Spectroscopy **E**nd **S**tation (TXPES) Project

- Analyze Chamber; Tentative System Components
  - XPS/UPS/AES Spectrometer
    - Containing benchtop UV and X Ray Sources
  - LEIS/ISS: Low Energy Ion Scattering/ Ion Scattering Spectrometry
  - Variable-Temperature Sample Manipulator (w/ Liq. He cooling), Angle-Resolved Sample Holder (w/ Liq. N<sub>2</sub> cooling)
  - Ion Gun for Depth profiling
  - Electron Flood gun



# Turkish Soft **X**-ray **P**hotoelectron Spectroscopy **E**nd **S**tation (TXPES) Project

- Sample Preparation Chamber; Tentative System Components
  - e-Beam metal evaporators x4,
  - Gas Dosers x2,
  - Atomic Hydrogen cracker,
  - QCM (Quartz Crystal Microbalance)
  - RGA (Residual Gas Analyzer)
  - Atomic layer deposition valve



**Thank You!**