

# Energy Dependence of Aluminum KL Double Ionization by Electron Bombardment

Heber Martinez.

University of Texas at El Paso

REU (2004) at the Cyclotron Institute, Texas A&M University.

Advisor: Dr. Rand L. Watson

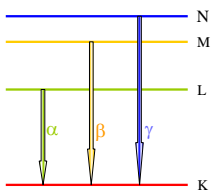
## Objectives

- Recondition a flat crystal spectrometer.
- Measure the aluminum intensity ratios  $I_{KL^1} : I_{K\alpha}$  as a function of electron beam energy.
- Compare with available results.

## Background

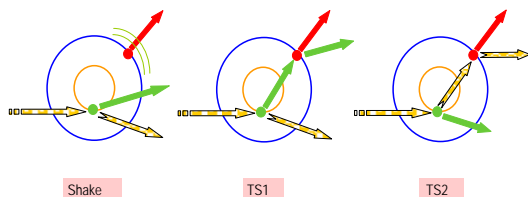
When an electron makes a transition from higher shells to fill a vacancy in the K shell, an x-ray is emitted. These x-rays are called  $K\alpha$ ,  $K\beta$ ,  $K\gamma$ , etc. depending on which shell they come from.

### Spectral lines in K x-ray spectra



The  $KL^1$  x-rays are the ones produced when one of these electronic transitions occurs in the presence of a vacancy in the L shell (Double Ionization)

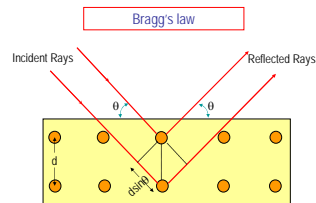
### Mechanisms for KL Double Ionization



Flat Crystal Spectrometer

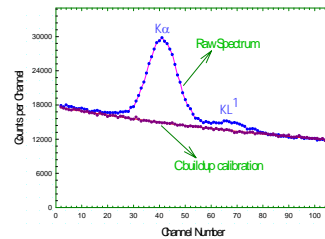


Complete Experimental Setup



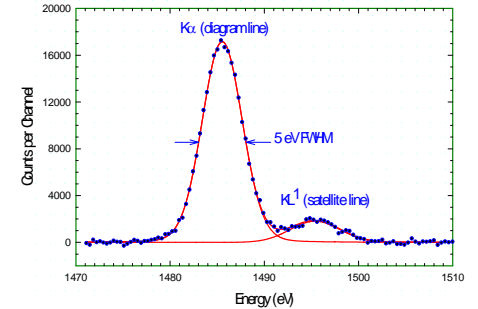
$$2d \sin \theta = n\lambda$$

5.0 keV electrons on aluminum.

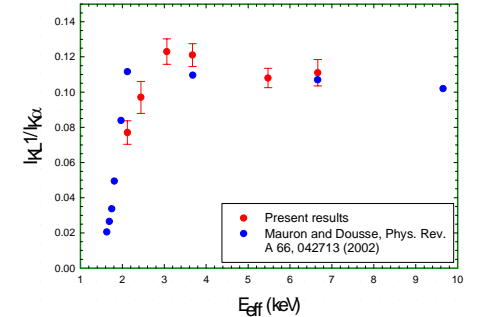


Problems encountered during the experiment  
 High Background due to Bremsstrahlung.  
 Carbon deposit on the target due to electron irradiation.

5.0 keV electrons on aluminum  
 Final Spectrum



Energy dependence of aluminum  $KL^1/K\alpha$  x-ray intensity ratio



## Acknowledgements

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 Institute

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