

**UWSP CHEMISTRY  
& PHYSICS DEPARTMENTS  
SPECIAL JOINT SEMINAR**

Lee Carlquist ATLAS Operations Group  
Argonne National Laboratory

**Friday, September 14, 2007  
2:00 PM  
A121 Science Building**



**Opportunities in  
Scientific Research  
& Technical  
Operations  
at Government  
Laboratories**

**Abstract:** Young people today are faced with many difficult choices when it comes to picking a career path. Choices in the sciences become even harder with so very many specialties to choose from. Working in government labs offer the opportunity to work in many of the scientific disciplines such as physics, biology chemistry, computer science, etc. all within the same laboratory complex. This presentation will try to convey the principle design and function of ATLAS (Argonne Tandem Linear Accelerator System) through the eyes of the chief shift operator for the accelerator. Emphasis will be on work involved in maintaining and tuning the accelerator system to deliver beams of ions from hydrogen up to uranium 238 to the experimenters target setups.

**Biography:** Lee Carlquist was born in Waukegan, Illinois and grew up in Villa Park, Illinois. A graduate of Willowbrook High School Lee went on to do 6 years in The US Army where he received training in RF (radio frequency) principles as well as electronics and communications systems. After receiving an AS degree from the College of Dupage in Glen Ellen, Illinois he took a job with Xerox Corp. working in field engineering for 24 years. During this time Lee pursued through self study his passion for the science of physics. After receiving generous donations of equipment from Fisher Scientific he began building accelerators in his basement laboratory. Armed with volumes of notes from his research Lee applied to Argonne National Laboratory physics division for the position of accelerator operator which was accepted. In addition to his current duties as chief shift operator he became system expert on The Van Degraph Tandem accelerator and the Negative ion source.

*Faculty, staff and students are cordially invited to attend*

### Announcements

- Read Chapter 2, Wiley Chapter 2 problems due Wed., Sept. 19<sup>th</sup> @ 11AM
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### Today's topics

- From atoms to compounds
- 12:30PM Quiz

### Clarification: Wiley re-do policy

- You must do the Wiley Graded set first
- The redo policy is meant to give a second chance for those that try. +91 people tried,
- Example:
  - Graded set: you score 8/10 (80%)
  - Before the first exam you do the conceptual problems & score 30/32 (93.75%)
  - I will take higher of the two (percentage\*10pts)
- Note:
  - Starting with chapter 2 problems if you score 4/10 or below on any of the problem sets, you are not eligible to have the score replaced.
  - The upgrade will almost always give you 10 pts unless you give up!

### What you need to know:

- Where are the following
  - Main block
  - Transition metals
  - Alkaline metals
  - Alkaline earth metals
  - Halogens
  - Noble gasses (or inert gas)
  - Inner transition elements
  - Metals, non-metals, metalloids
  - Which are normally gas, liquid, solid
- Symbol and spelling for first 36 elements

### Flashcard tool

- Flash card maker
  - <http://chemdept-nmr.uwsp.edu/~mzach/Chem105/MZachLectures.html>

## Main group & transition metals

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Ha	Sg	Ns	Mt										

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Main group
  Transition metals
  Inner transition metals

## Named groups

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Ha	Sg	Ns	Mt										

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Alkali Metals
  Alkali Metals
  Halogens
  Noble Gasses

## Named groups

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Ha	Sg	Ns	Mt										

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Metals
  Non - Metals
  Metalloids

## Solid, Liquid and Gas

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Ha	Sg	Ns	Mt										

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Solid
  Liquid
  Gas

## What can we do with the elements directly?

- Building components
  - Fixed physical properties
  - **Thinking assignment: what items around you are made of pure elements?**
- Atoms as projectiles

## What happens to gas molecules in e<sup>-</sup> beam?

