My Summer at the Ion Beam Lab

Anh Nguyen

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What is Materials Science?

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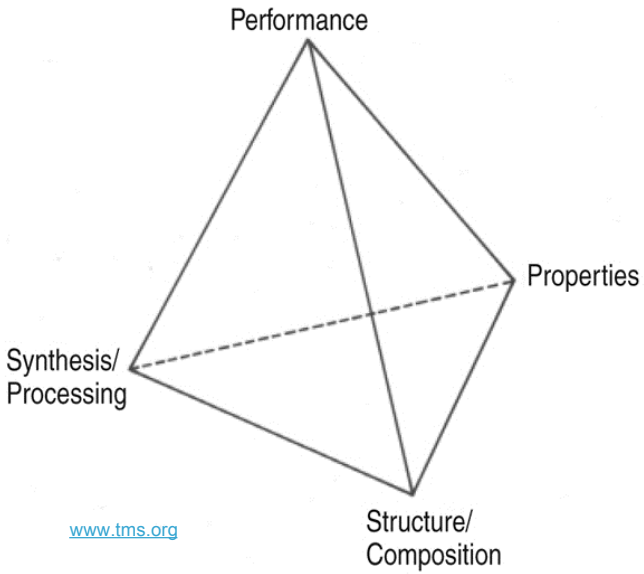
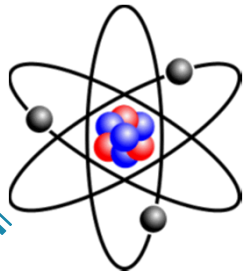
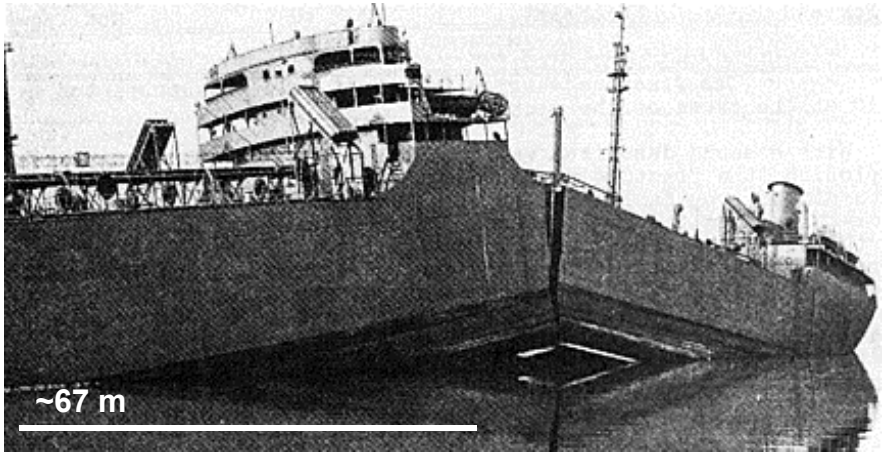


www.tms.org

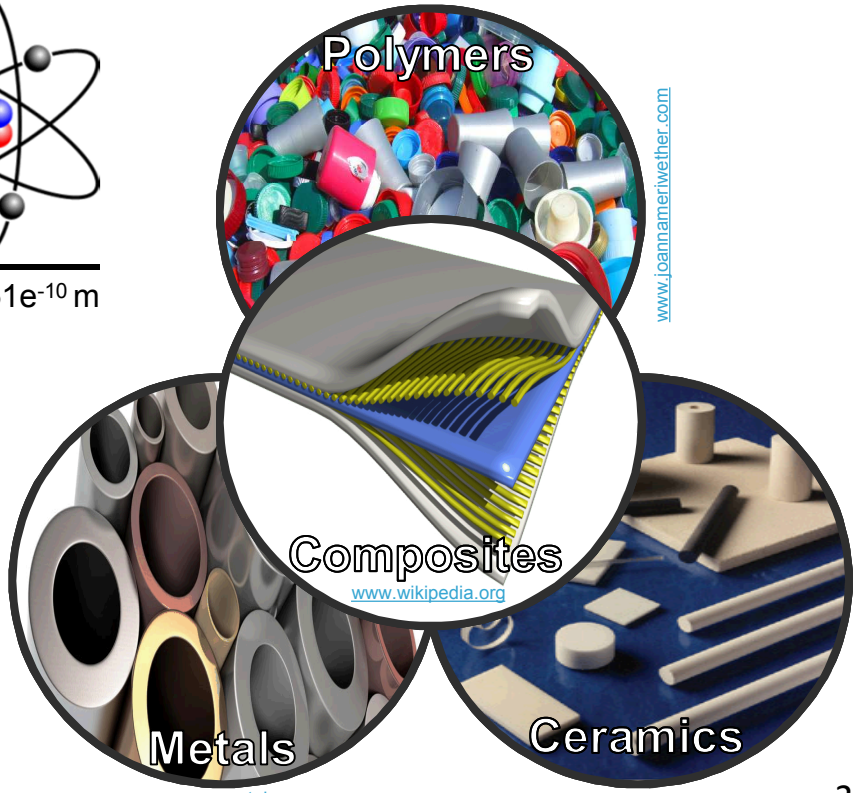
- A study of materials and their properties
- Interdisciplinary
- Analyze defects, study components, modify materials



~1.51e^{-10} m



www.soetelaboratory.ugent.be



www.joannameriwether.com

www.wikipedia.org

www.arrow-metals.com

www.azom.com

Ion Beam Modification and Analysis

Sandia National Laboratories

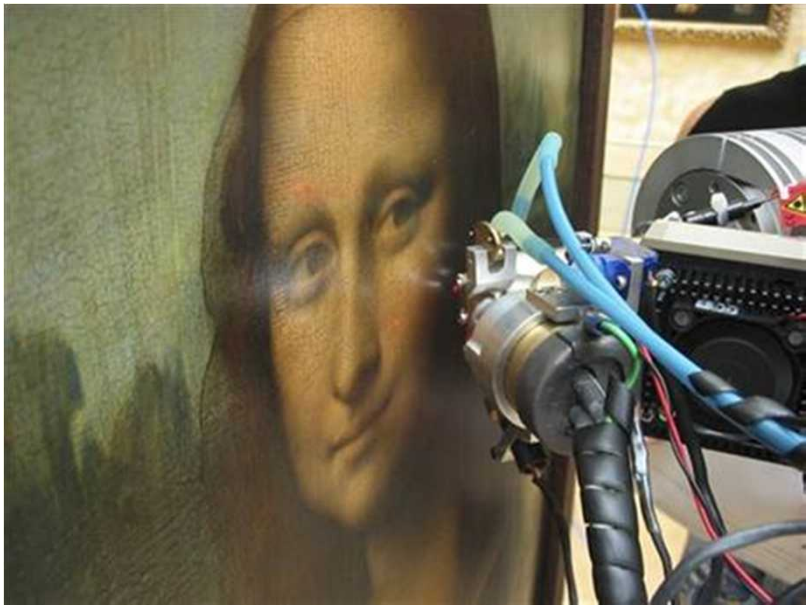
VIDEO

Ion Beam Modification

- The modification of a material using an ion beam
  - Shoot particles at a material
  - Damage, implant, change structure or properties, add charge to material
  - Modification at the nanoscale

Ion Beam Analysis

- Analyzing the structure and composition of a material using an ion beam
  - Determine crystal structure, grain size, chemical composition



IBA used for art analysis www.nbcnews.com

The Ion Beam Lab

The IBL is equipped with technology that can be used in a variety of techniques, including IBM and IBA. However, a gap still exists in the energy range that can be covered by existing equipment.

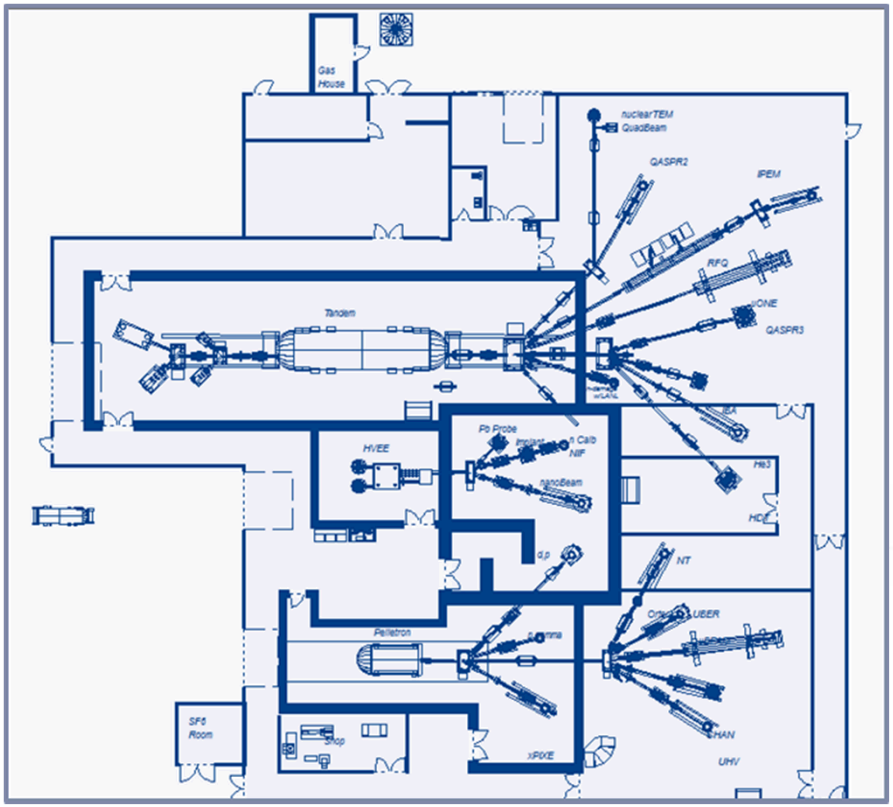
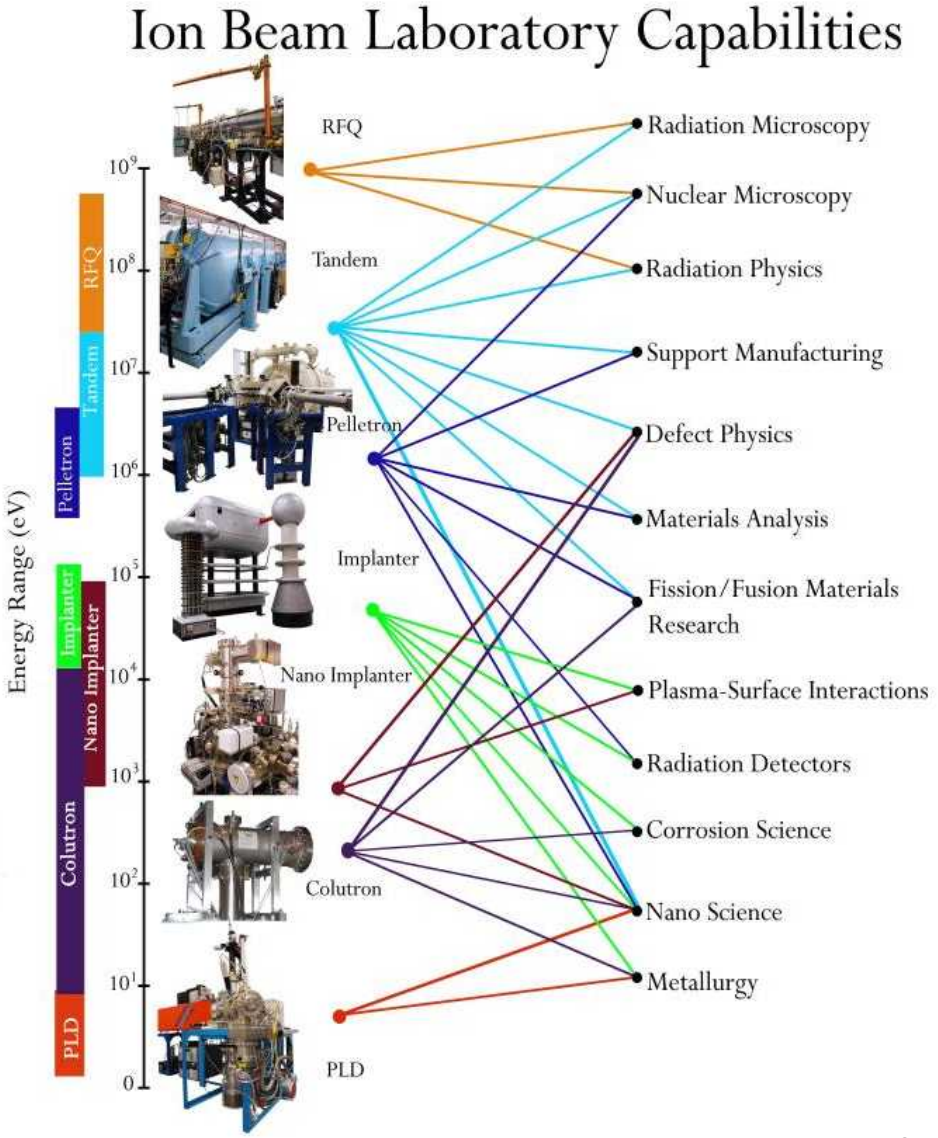
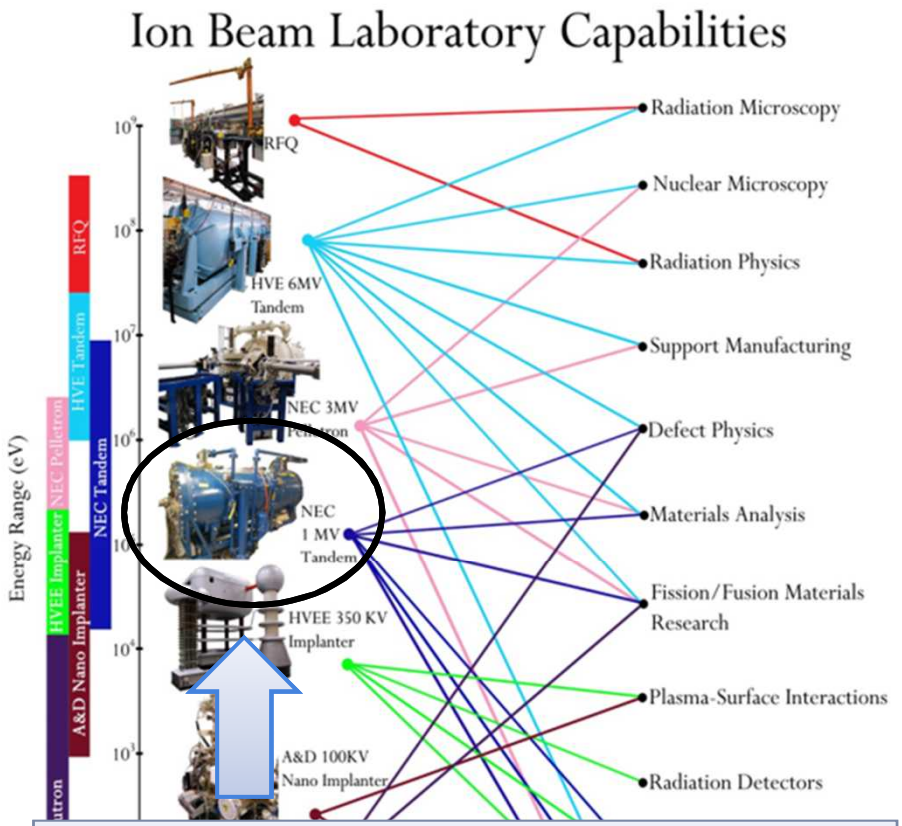


Diagram courtesy of Mackenzie Steckbeck



The Tandem Accelerators



- The baby tandem allows us to fill in the gap in the energy range of the IBL
- Around 6 tons
- Used to accelerate particles that are $1.67e^{-24}$ g to $3.27e^{-22}$ g

The Tandem Accelerator

- Strips electrons from atoms, making a positive charge that causes them to be accelerated by repulsion of charges

Unloading & Moving

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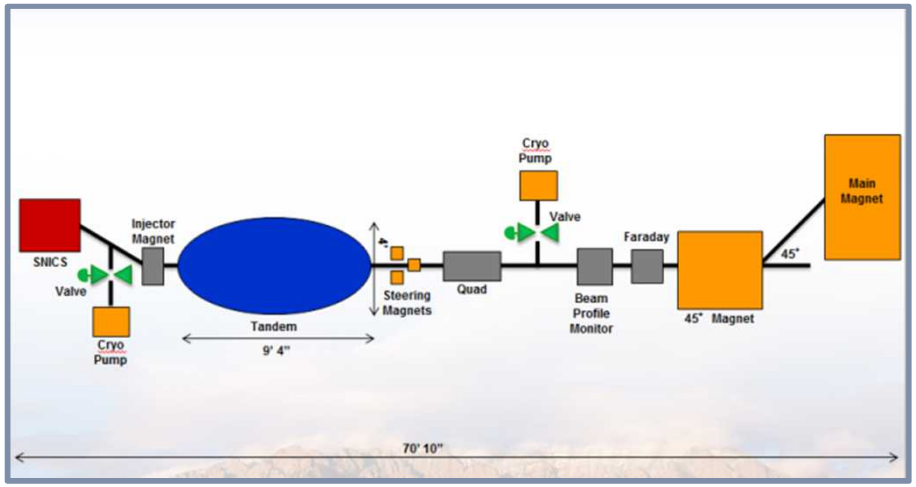
Assembly & Installation



- Cartoons & blueprints help to guide installation
- Includes measurements & components
- Rough setup

Current Progress

- Baby tandem has been unloaded and moved into the appropriate room
- All components have been unloaded and stored
- Preliminary beamline calculations

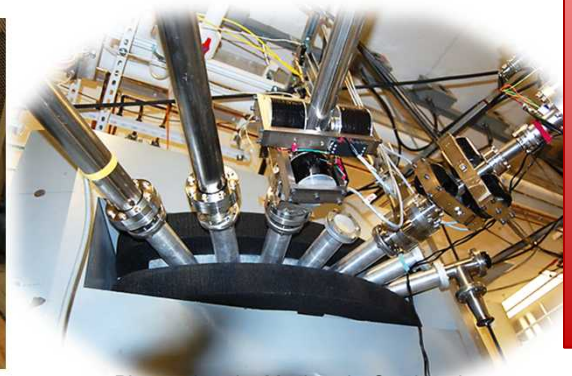
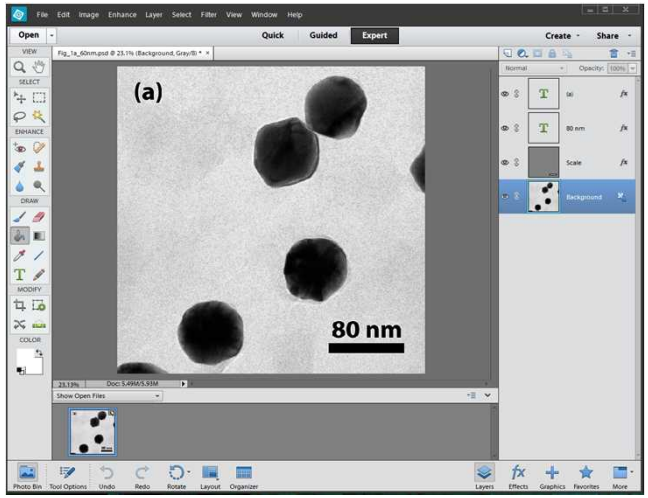


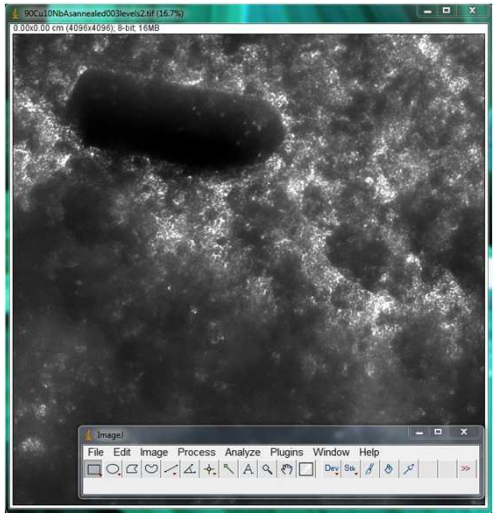
Photo taken by Mackenzie Steckbeck

CURRENT PICTURE OF BABY TANDEM

Conclusions

- What I learned:
  - The basics of materials science
  - The general functions of IBL equipment
  - Ion beam modification and analysis
  - The functions and setup of a tandem accelerator
  - Programs such as ImageJ, SRIM, and Photoshop





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