Working Group Summary

Miscellaneous Applications of RIA:

Materials Science, Condensed Matter, Space Applications, Radiation Damage, Mechanical Engineering, etc.

Participants

- Peggy McMahan, LBNL
- Pierre Bricault, TRIUMF
- Gerald Morris, TRIUMF
- Peter Fehsenfeld, Karlsruhe
- Christine Eifrig, Karlsruhe
- Janet Sisterson, MGH
- Dave Vieira, LANL
- Ben Gibson, LANL
- Jerry Nolen, ANL
- Mike Nastasi, LANL
- Al Zeller, MSU

Talks

- Peter Fehsenfeld - Wear Testing
- Gerald Morris - Beta-NMR
- Peggy McMahan - Space Applications
- Janet Sisterson - neutron cross section measurements for cosmic ray studies
- Al Zeller - neutron damage of magnets
- Jerry Nolen - ultracold neutrons at RIA
- Mike Nastasi - radioactive probe for Pu studies; radioactive beam implantation for angioplasty

Applications Considered, I.

- Radioactive Beams
  - beta-NMR
  - radioactive probes of materials (PAC, etc)
  - radioactive implantations for wear, corrosion and kinematics testing - engines, prosthetics, etc
  - radioactive implantations for medical therapy - stents, wires, seeds

Applications Considered, II.

- Neutrons (20-400 MeV)
  - neutron damage studies - magnet parts, etc
  - neutron cross section measurements
  - radiation effects testing with neutrons
- Neutrons, moderated
  - should have some general capability to handle both nuclear physics and applied experiments which cannot be handled at SNS
- Neutrons, Ultracold
  - no practical applications were known

Applications Considered, III

- Use of primary beam into general purpose station
  - radiation effects testing
  - radiation biology
  - radioactive material production

Questions

- Applicable to RIA?
- Unique to RIA?
- Fit into running dynamics?
- Resources needed?
- Extent of need?
- Long term outlook?
- Likelihood of outside support?

Possible Operation Modes

- Beam sharing with other experiments
- Parasitic running
  - high energy neutrons
  - possibly use of separated beams not sent to post accelerator
- Offline parasitic running
  - use of long-lived products from target stations either through post accelerator or offline

Conclusions

- No applications truly unique to RIA
- There are classes of applications which could make use of:
  - unaccelerated (100 eV - 100 keV) beam implantation area
  - low energy (1-5 MeV total) implantation area
  - fragmentation (400 MeV/u) area
  - fast neutrons (20-400 MeV)

Unaccelerated Beam Implantation Area

- Beta-NMR - light RIBs with spin 1/2 preferred
  - superconductors
  - semiconductors
  - magnetism
- Perturbed Angular Correlation Studies with Radioactive Probes - ions TBA
  - high Tc superconductors
  - study of defects in Pu and other material

Low Energy Implantation Area (1-5 MeV)

- Wear testing - ^{7}Be, ^{22}Na
  - long-lived; might be done off line
- Implantations for medical uses - TBD
  - beta and alpha emitters for
    - angioplasty - prevents artery from reclosing
    - cancer therapy

Fragmentation Area

- Radiation Effects testing -stable/near stable ions
  - might be able to do parasitically
- Radiation Biology
- Radioactive target/material production

High-energy Neutrons

- Neutron cross sections
  - – may or may not need TOF
- Neutron damage studies
  - – no TOF needed
- Radiation Effects Testing

Similar neutron facilities available elsewhere (WNR), but there is a general feeling that more are needed and a parasitic mode at RIA should be utilized

Conclusion

- None of these are unique, and
- it will cost some money to add capabilities, and
- it might take some effort to get industries on board, but
- several of these applications together may be strong enough to justify a beam area, and
- we should keep enough flexibility in facility design to be able to add others later as needed