



... for a brighter future



U.S. Department of Energy  
Office of Science

## ***AWA Facility Operation***

*Manoel Conde*

*2008 ISM Review*

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### ***Argonne Wakefield Accelerator (AWA)***

- We conduct our operations in a professional and safe manner. The work we do here is very important and we are eager to obtain results, but nothing justifies compromising our safety standards.
- We design and build multi kA electron beam sources using RF photocathode based technology. We have unique beamlines to study wakefield acceleration methods.

## ***AWA Safety Envelope***

- Defined by design maximum beam intensity generated by the drive beam.
  - 400 nC/pulse (maximum charge possible with available laser power and best photocathode QE).
  - 20 MeV, 30 Hz (maximum rep rate of rf system)
  
- Actual performance of the AWA is significantly reduced from the design maximum values.
  - 100 nC/pulse maximum, 40 nC typical (limited by QE).
  - 15 MeV, 10 Hz (laser limitation)

## ***AWA Hazards***

- Ionizing radiation
  - Drive beam (40 - 100 nC, 15 MeV, 10Hz)
  - Witness beam (1 nC, 4 MeV, 10 Hz)
  - Klystron (X-rays, enclosed in lead shield)
- Laser system
  - Eye damage
- High Voltage (RF supply cabinets interlocked)
- High power RF 1.3 GHz (survey/approval by IH)

## ***Interlock System***

- Based on relay logic. Three modes of operation: Beam, RF only, Laser only.
- No major changes to interlock hardware since original SAD.
- First person entering vault after machine has been running required to use an alarm digital dosimeter (no radiation indicated on any access).
- Interlock checked routinely (Laser: every 3 - 4 months or whenever operated. Vault: Bi-annually)

## ***Review of new experiments***

- In accordance with requirements from previous ASRC reviews, we continue to conduct formal safety reviews of new experiments.
- There are three experiment / facility modification categories (classified by AWA group leader) :
  1. Covered as routine by SAD and require no special analysis (majority of experiments).
  2. Those requiring moderate changes to targeting, beam dump and beam transport. Requires Reed's approval.
  3. Major modification of accelerator components (e.g., new gun). Requires Divisional or external review. Possible SAD update.

## ***Safety reviews and inspections***

- ASRC (every 3 years)
- Division Director Bi-annual Safety Inspection.
- HEP Safety inspections.
- Others:
  - ANL Management (Director, ALD, ESH/QA Director, DOE).
  - Special radiation interlock audit
  - Documentations.
- 60+ safety related reviews conducted since beginning of the AWA operation



## ***Facilities Upgrades and Modifications in the last three years and in the near future:***

Not many changes, other than the relocations of the RF room and Cathode Preparation room.

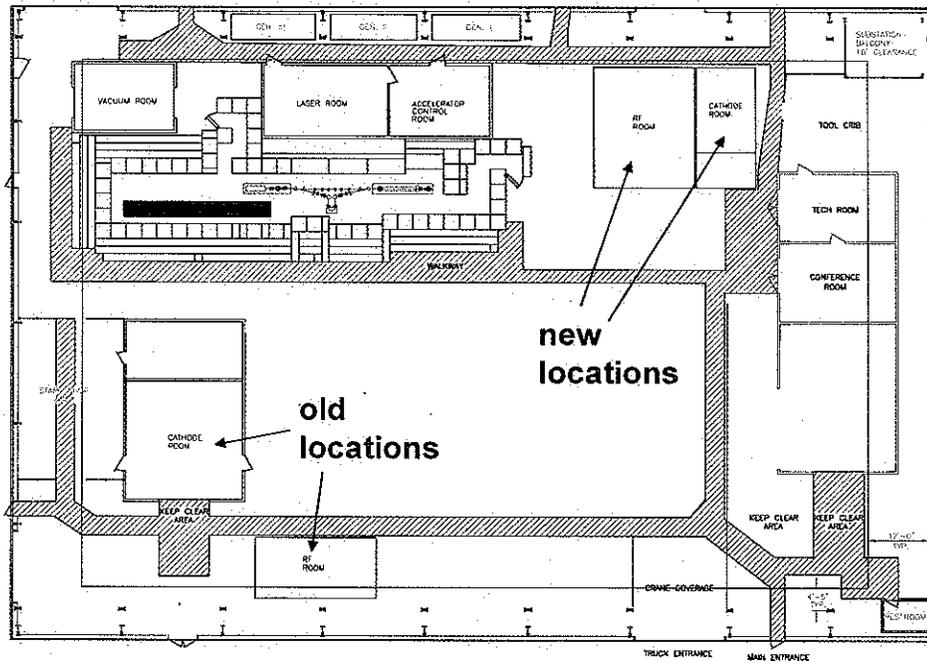
However, several modifications and upgrades are now in their initial stages (planning and preparations).

- Installation of "old" half-cell RF gun for breakdown studies (being installed on the "old" beamline tables).
- Finishing construction of new RF gun (G3). It will be commissioned on the "old" beamline tables. It will employ Cesium Telluride photocathodes to make long bunch trains.
- New RF station being constructed. Borrowed 30 MW Litton klystron from Los Alamos. New Pulse Forming Network being put together.
- New RF circulator and waveguides for RF power distribution from new RF station.

Ad hoc safety reviews and shielding calculation will be needed.



# Relocation of the RF and Cathode Preparation Rooms



## Final Remarks

- We have conducted our experiments in compliance with the safety requirements.
- No safety related issues in the last 3 years. 😊
- Many fruitful physics results obtained. 😊