

# RaDIATE BNL BLIP Irradiation Run Planning VC Meeting 11

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## Present

FRIB: Frederique Pellemoine

CERN: Elvis Fornasiere, Claudio Leopoldo Torregrosa, Marco Calviani

BNL: Leonard Mausner, Dmitri Medvedev

KEK: Taku Ishida

ESS: Yongjoong Lee, Cyrille Thomas

FNAL: Patrick Hurh, Kavin Ammigan

RAL: Chris Densham

PNNL: Dave Senior

## Notes

- BLIP operation update
  - Leonard informed us that the end of the normal BLIP run is now June 30<sup>th</sup> instead of July 31<sup>st</sup>. Therefore, we need to start our experiment by the end of April at the latest in order to obtain eight weeks of irradiation.
  
- BLIP safety committee review
  - The safety committee has requested that we identify a certified container, as well as perform dry-runs of loading the shipping container with capsules before approving the experiment.
  - ORNL-SNS is lending us a 110 gallon Type A container, which has already been shipped to BNL
    - Container and paint cans expected to be delivered by the end of the week.
  - Leonard and Nick will help organize dry-run at BNL
    - Dry-run will involve simulating the loading of the high-z capsule into a paint can first, and then loading of the paint can into the 110 gallon Type A cask.
    - Spacers for the bore of the Type A container will also need to be fabricated so that paint can is centered vertically in the container.
    - Depending on updated FLUKA analysis results, extra shielding (steel or lead) may be added inside the paint can to further lower external dose.
  - Nick will update his FLUKA activity/dose-rate analysis with the new container geometry (drawings already sent to BNL).
  - High dose rate to hot cell operator when removing the target box contain the high-Z capsule was another issue raised by the safety committee. The suggested solution is to add extra temporary shielding inside of the BLIP hot cell as well as outside of the hot cell. However, this is still a pending issue, but may be avoided if target box (with high-Z capsule) is allowed to cool-down for an extended period of time in the BLIP beam line (see below).

- Experiment start date
  - The suggested delayed start date of March 27<sup>th</sup> is likely not feasible at the moment. Dry-runs and capsule reworks still in progress.
  - Now considering to start experiment about 9-10 weeks before the end of the BLIP normal run – around April 21<sup>st</sup>.
    - This will give us an extra 1-2 weeks to make up for any potential downtime in beam.
    - Also planning to run the high-Z capsule during the last two weeks of our run, with the possibility of leaving the target box in the beam line for further cool-down prior to extraction from BLIP hot cell.
      - Will help lower dose-rate to operator which will ease concern of safety committee.
    - If possible and approved, we may run for longer than 8 weeks and up to 10 weeks (at additional cost to RaDIATE).
  - If BLIP run ends before our 8-week irradiation, there is the possibility of extending BLIP operation just for our experiment. RaDIATE will then have to pay the full cost of running BLIP for additional time, which is around \$145k per week at 180 MeV.
  
- Capsule updates
  - The high-Z, Si, Be, US Ti and DS Ti capsules were all successfully welded and already at BNL ready to be installed.
  - Capsule re-work: with the delayed start of the experiment, we've decided to re-work the Al and C capsules
    - Al capsule
      - Upon inspection of the capsule delivered at BLIP, several bumps of the thin discs were observed on the surface of the capsule and it is not clear whether these have shifted out of position.
      - A sample of the welded hole (used for He back-fill) at Julich also showed that the window thickness in that region was reduced by about 50%. With the hole located in the thermal gradient region of the BLIP rastered beam, high stress concentration may arise.
      - To mitigate the risks associated with the ESS capsule, a new capsule (FNAL design) will be fabricated with the windows laser welded at EB industries.
        - First damaged ESS capsule will be shipped to FNAL for opening and retrieval of specimens.
      - ESS colleagues planning to be present during capsule assembly and welding.
    - C capsule
      - Welded capsule had very distorted window due to the electron beam welding. As a result, outer filler pieces had to be sanded down to allow proper fit of the specimens and in the process graphite dust contaminated the weld area. Weld was fixed and capsule passed leak check, but final quality is unknown.

- With the large distortions in the windows, there is a possibility that some specimens might have been broken when the second window was forced down into the capsule prior to welding.
  - Back-up C capsule is being machined and new window welds with a laser beam will be performed at EB industries.
- Vacuum degrader
  - Vacuum degrader has to be reconfigured in order to correctly orient the energy mask with the graphite outer filler pieces in the high-Z capsule.
  - New flats in the correct locations will be machined on the capsule.
- Potential dates
  - Welding of Al/C capsules: April 3<sup>rd</sup> week.
  - Start of experiment: April 21<sup>st</sup>/28<sup>th</sup>