PIP2IT CRYOMODULE UPDATE AND FUTURE TESTING PLANS
LID REPAIR ESTIMATES

- All 6 WEKA valves need to be replaced.
  - Originally reported 4 of the 6 WEKA valves needed to be replaced.
  - The 2 additional valve bonnets are bad above the nitrogen heat shield.
  - 6 valves have been ordered. ETA 12 weeks.

- All 4 helium bayonets need to be replaced.
  - Parts will be made as part of the lid repair.

- 70 K aluminum thermal radiation shield:
  - Need to remove the shield to determine if any 70 K GHe trace tubing is damaged. Half of the 70 K GHe trace tubing is leak tight.
  - Where the lid’s 70 K aluminum thermal shield contacted the electronics rack need bending and the MLI repaired.

- Several ISO flanged nozzles on the lid require polishing.

- Need to start leak checking the lid components:
  - RF feedthroughs.
  - Cool-down manifolds.
  - Slow tuner gas line feedthrough.
  - Instrumentation feedthroughs.

- The ANL safety investigation has not freed us to work on the lid yet.
- ANL is paying for these repairs with funds independent of this WFO.
WEKA VALVE EXAMPLES
We are preparing a package for bidding the lid repair. We hope to finish the package by this Friday and send to Meyer Tool and ANL-CS next week.
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CRYOMODULE TESTING PLANS

- It is our firm belief that preliminary testing of the HWR cryomodule at ANL will save significant time and effort.
  - leak testing of all subsystems,
  - measurement of all instrumentation,
  - alignment checks, and
  - if the leak testing is successful and we can get ANL Health Physics approval:
    • move the fully assembled HWR cryomodule to the Accelerator Development and Test Facility (ADTF),
    • full thermal cycle of the HWR cryomodule to 4.5 Kelvin,
    • cold leak testing,
    • performance characterization of all HWRs at 4.5 Kelvin, and
    • testing of all magnet packages at 4.5 Kelvin.

- We had a plan in place with ANL riggers to move the cryomodule ~1 mile between where it is being assembled and where it would be tested.
  - Riggers management has changed and we are trying to work out the plan again.
  - No serious effort will be put into this until we are ~2 months out from the move.

- The ADTF is a controllable area which we can lock the doors too. It is expected that with the correct amount of negotiation we will be able to perform limited testing in there.

- FNAL personnel are encouraged to participate in all testing at ANL.
We are assembling the half-wave resonator cryomodule in building 366 at Argonne.

In BLDG 366 we are fully prepared to:
- leak test all subsystems,
- measurement all instrumentation,
- check the beam line component alignment, and
- if the leak testing is successful, cool the cryomodule to 100 K for cold leak testing and alignment verification.

The cost to cool the cryomodule to 4.5 K in BLDG 366 is prohibitive.

Need to move the cryomodule to our test facility for thorough testing and verification.
- FNAL personnel are encouraged to participate in all acceptance testing.
CRYOMODULE TESTING PLANS - ADTF

- Hardware available for testing:
  - 50 W, 4.5 K refrigerator,
  - 162.5 MHz, 100 W RF amplifier,
  - more liquid nitrogen than we need, and
  - 162.5 MHz, 6 kW RF amplifier on loan from FNAL.

- Floor space is sufficient.

- Cryomodule move does not limit the work.

- Radiation shielding is the limitation.

HWR Cryomodule in ADTF for Engineering Cool Down

HWR Cryomodule Move into ADTF
CRYOMODULE TESTING - COSTS

- We are not budgeted to perform the final 4.5K testing. Costs estimates for this are evolving as health physics requirements evolve.
  - Schedule duration = 3 months, with 5 man-months of effort:
    - physicist effort = 2 months (Z. Conway and M. Kelly),
    - engineer effort = 2 months (3 ANL Accelerator Development Engineers), and
    - technician effort = 1 month (technician for radiation surveys).
  - Materials:
    - QTY = 5, 500 l, liquid helium dewars;
    - disposables: gloves, wipes, tape, plastic, temporary covers for transport, etc;
    - QTY = 2 liquid helium transfer lines; and
    - transportation rigging.
  - Services:
    - ANL Riggers.
    - ANL Health Physicists.
    - ANL HSE (Health Safety and Environment Division).

- Total cost not shown here. Who should I send it to?
SUMMARY

- We apologize for the added work and complications due to the lid falling from its stands.
- We are paying for the repair effort and M&S from our own internal funds.
  - FNAL is not being charged for this.
- Expect the lid to be ready for use in 6 months.
  - This does not delay the schedule in view of the half-wave resonator/power coupler testing.
- HWR cryomodule testing at ANL:
  - FNAL personnel are strongly encouraged to participate,
  - major cost and time saving are available by testing at ANL before shipment to FNAL, and
  - ANL’s facilities are capable of performing the work but we need Health Physics Approval prior to committing.
    - The preliminary review from Health Physics will be held Tuesday, 29 August 2017.
- Thank you for your support and patience.