



# LAT Calibration Unit CERN Beam Test Status



# Overview

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- **Official CERN schedule released**
  - 4 weeks at T9/PS, July 27 – August 22
  - 2 weeks + 1 day at H4/SPS, 4-18 September
- **Dedicated workshop at INFN-Pisa on March 20-23 ([web site](#))**
  - Most of the infrastructure has either been defined and/or tested
  - A core group has been identified for the main beam tests tasks
- **Highlights of the Workshop**
  - **Baseline solution for DAQ and data streams merge exist**
    - files from both systems have been produced
  - **Offline infrastructure borrowed from LAT with dedicated additions and customizations planned**
    - initiated transfer of know-how from SLAC to Europe
  - **MGSE for CU integration, transportation and exposure in the beam area presented and agreed**
    - plan a review with a broader group by end of April
  - **Beam test plan discussed and data analysis oriented for plan finalization**
    - begin MC simulations with CU geometry to support plan
  - **Next workshop will happen in the 2<sup>nd</sup> half of May during CU system test**
    - expect data from 2 tower + 2 ACD tiles + ancillary readout system
    - review results from MC simulations
  - **Overall schedule in place**
    - Next milestone: hardware delivery to Italy and handling and test plan review by April 13



# INFN-Pisa Beam Test Workshop highlights

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- **Data acquisition (SLAC, INFN)**
  - **CU DAQ with LATTE 4**
    - **New online monitor for beam test in place**
  - **Single DAQ for all ancillary provided by INFN-Bari**
  - **Synchronous data acquisition with common CR external trigger + fast external veto was proven (up to 500Hz with random trigger)**
    - **Data merge will happen online at LDF level through specific modules to be provided**
- **Offline Infrastructure, Simulation/Reconstruction (SLAC, INFN, IN2P3)**
  - **SLAC pipeline for data process, recon files, offline reports**
  - **FastCopy<sup>©</sup> connection for data transfer from Pisa to SLAC established (speed optimization and CERN installation TBD)**
  - **Dedicated BtRelease simulation/reconstruction package to be released**
    - **Final ACD location agreed and transferred to simulation**
    - **Mass production of simulated data at SLAC following beam test draft plan will start next week**
    - **A prototype of lite-recon within Gleam presented as a quick local offline monitor**
  - **Beam test dedicated confluence pages and workbook section will be available for users forum and support**



# INFN-Pisa Beam Test Workshop highlights

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- **Integration of modules in the 1x4 grid (INFN)**
  - **Standard TKR integration**
  - **New CAL integration from bottom**
    - **Same restraints and degrees of freedom as SLAC but different constraints from INFN clean room**
    - **New MGSE being procured**
- **Inner Shipping container (INFN)**
  - **Design presented and agreed**
  - **Interfaces to CU, XY scanning table, ACD tiles defined**
  - **Temperature and humidity control defined**
- **Outer Shipping container (INFN)**
  - **Design presented and agreed**
  - **OSC+ISC proof test campaign presented**
- **XY scanning table (LLR)**
  - **Design presented and agreed, interfaces to ISC and beam areas defined**
- **Final review of MGSE to happen soon before we start production**
  - **proposed date for release by INFN is april 21, april 28 for approval**



# CU integration and test schedule

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- Worked backwards on the schedule starting from
  - CU delivery to CERN on 7/15 (PS beam starts on 7/27)
  - leave flight spares at SLAC to last moment to support flight software test and cover LAT I&T and NRL env-test to maximum possible
  - **INFN ready for integration on 5/5**
    - grid rework at INFN
    - new MGSE procurement
- Delivery of spare flight modules and CU integration in 3 separate phases
- Full system test anticipated in 2<sup>nd</sup> phase (15-30 May) with partial system to minimize system test time with complete CU
  - system test will be on 2 complete towers in the grid, 2 ACD tiles, all ancillary detectors, plus data synch and offline pipeline in place
  - next workshop will happen during system test
- **Drop dead dates** (but INFN is ready to receive everything as early as possible)
  - SLAC must ship (10 days to reach INFN):
    - 2 ACD tiles and spare FREE board currently not in use on **4/3**
    - TKR FM8 and CAL FM101 on **4/18** (for bay 3 → TEM inversion at SLAC)
    - CAL FM109 on **5/17** (for bay 1 with TKR16 → TEM inversion at SLAC)
    - remaining ACD tiles on **5/31**
  - Flight hardware handling and test plans
    - release from INFN by **4/6**
    - approval from the project by **4/13**



# Flight Hardware Handling and Test Plan

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- Follow procedures used by INFN when dealing with TKR flight hardware in Pisa
  - incorporate needs for CAL hardware in the plan
- Identify requirements for transportation and usage at CERN
- Incorporate plan to de-integrate and ship FHW back to USA in case LAT spares are needed
  - expected duration while at INFN: 4 days + 3 for customs and shipment
  - If at CERN: a stop should be considered only between PS and SPS data taking – a stop during any of the two data taking time would flaw the whole effort and would be very expensive for all the institutions involved; time estimate would be:
    - 2 days to remove ISC from area, 1 day for swiss customs, 2 days for transportation to INFN, 4 days at INFN + 3 days for customs and shipment
- Define test sequence for all hardware modules and CU system test
- Flight hardware handling and test plan release by april 6