FD Single Phase TPC Update and Opportunities

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FD General Meeting

Nov. 3, 2015

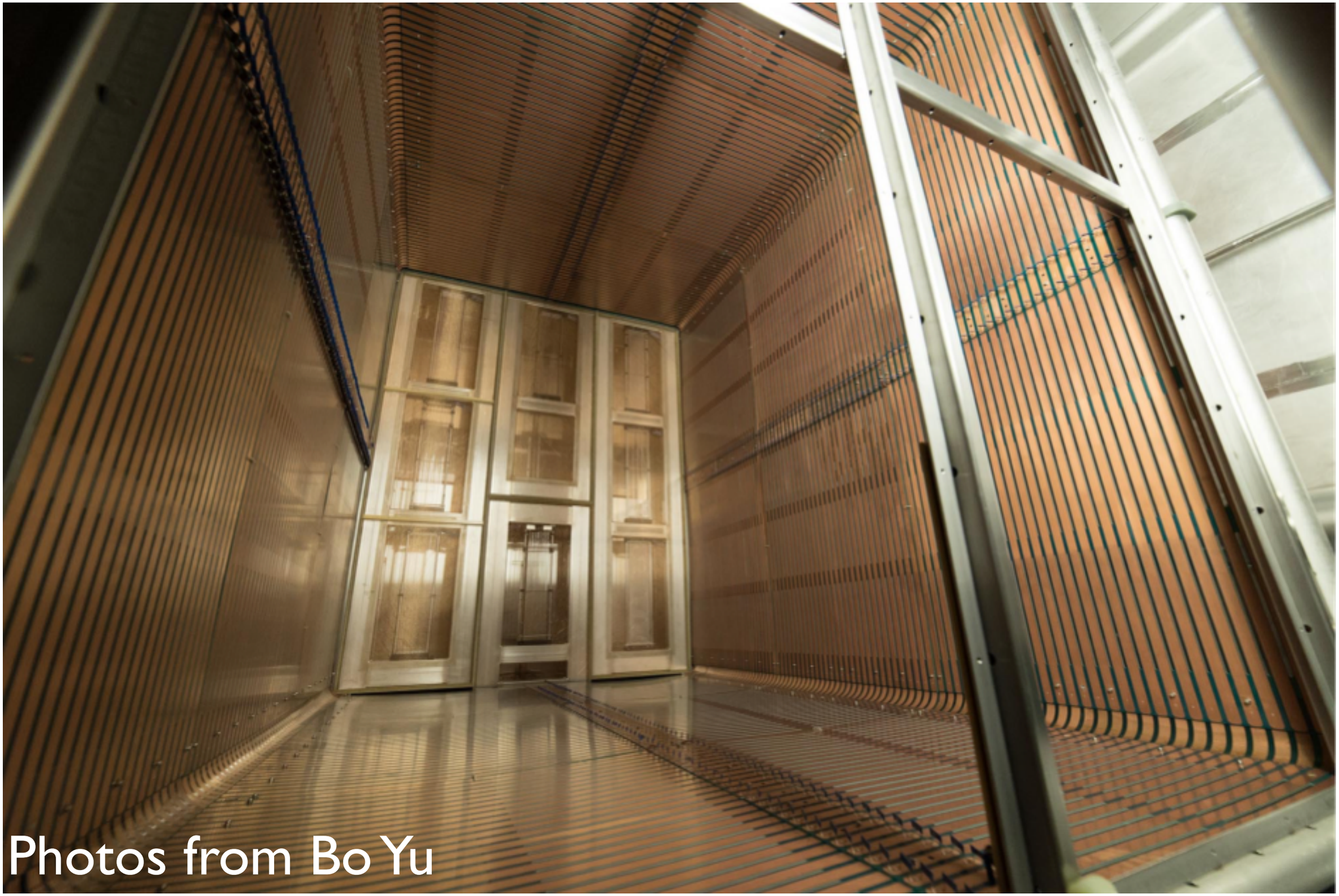
FD Single-Phase TPC WG Update

- Working group is focused on developing design, prototypes, production and integration plans, for the single-phase Far Detector TPC.
- Reminder: meeting time is Detector Week Wednesdays 9-10am CST
- In this talk will give very brief update on recent goings-ons, and describe opportunities for new collaborators to get involved with this group.

Recent Work

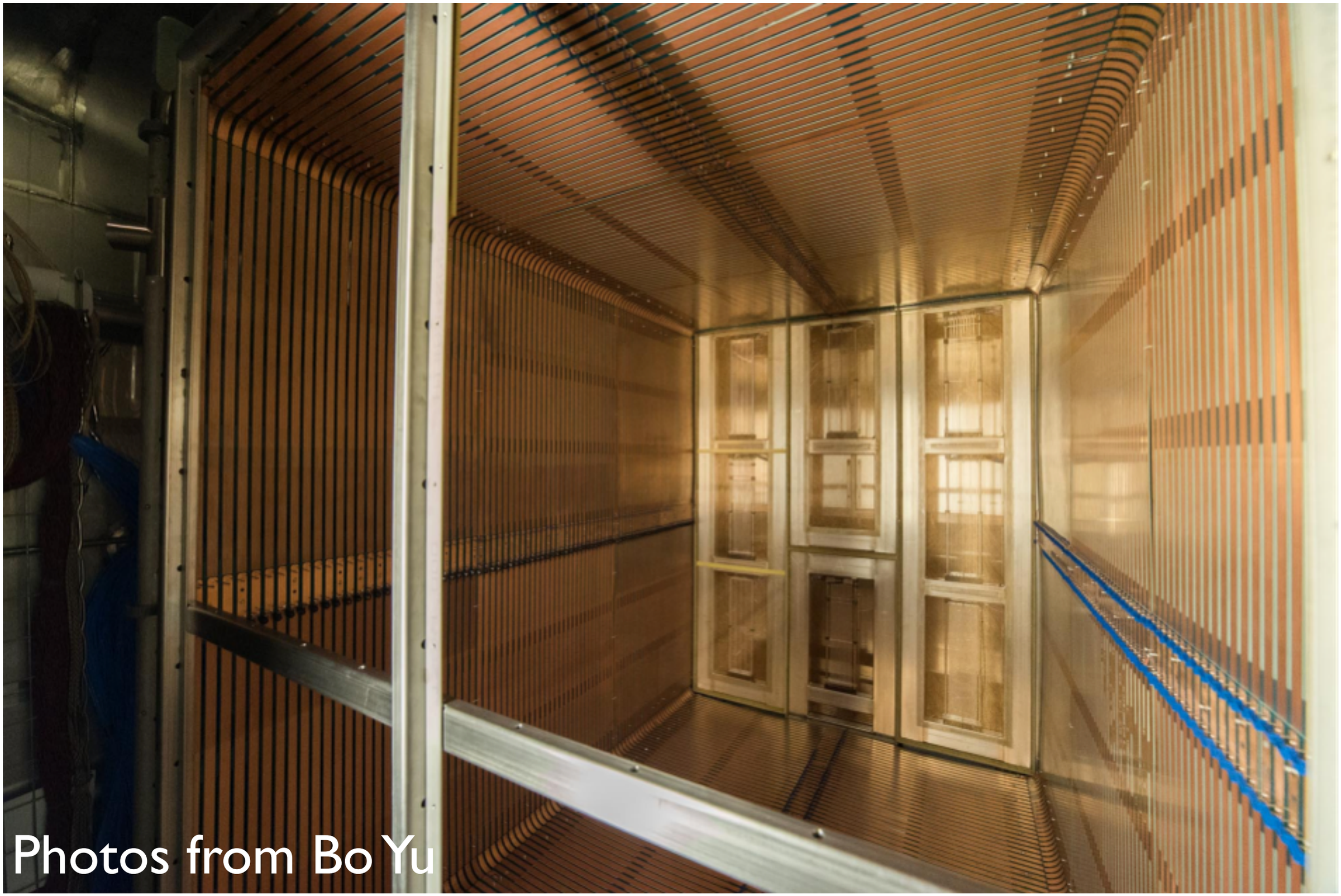
- Recent meetings have included overview of latest TPC design, updates from FD Task Force, updates from various working efforts (e.g. - wire-winding at PSL).
- Several TPC WG members busy participating in 35 ton TPC installation (see pictures from Bo Yu on following slides).

35 Ton TPC Install



Photos from Bo Yu

35 Ton TPC Install



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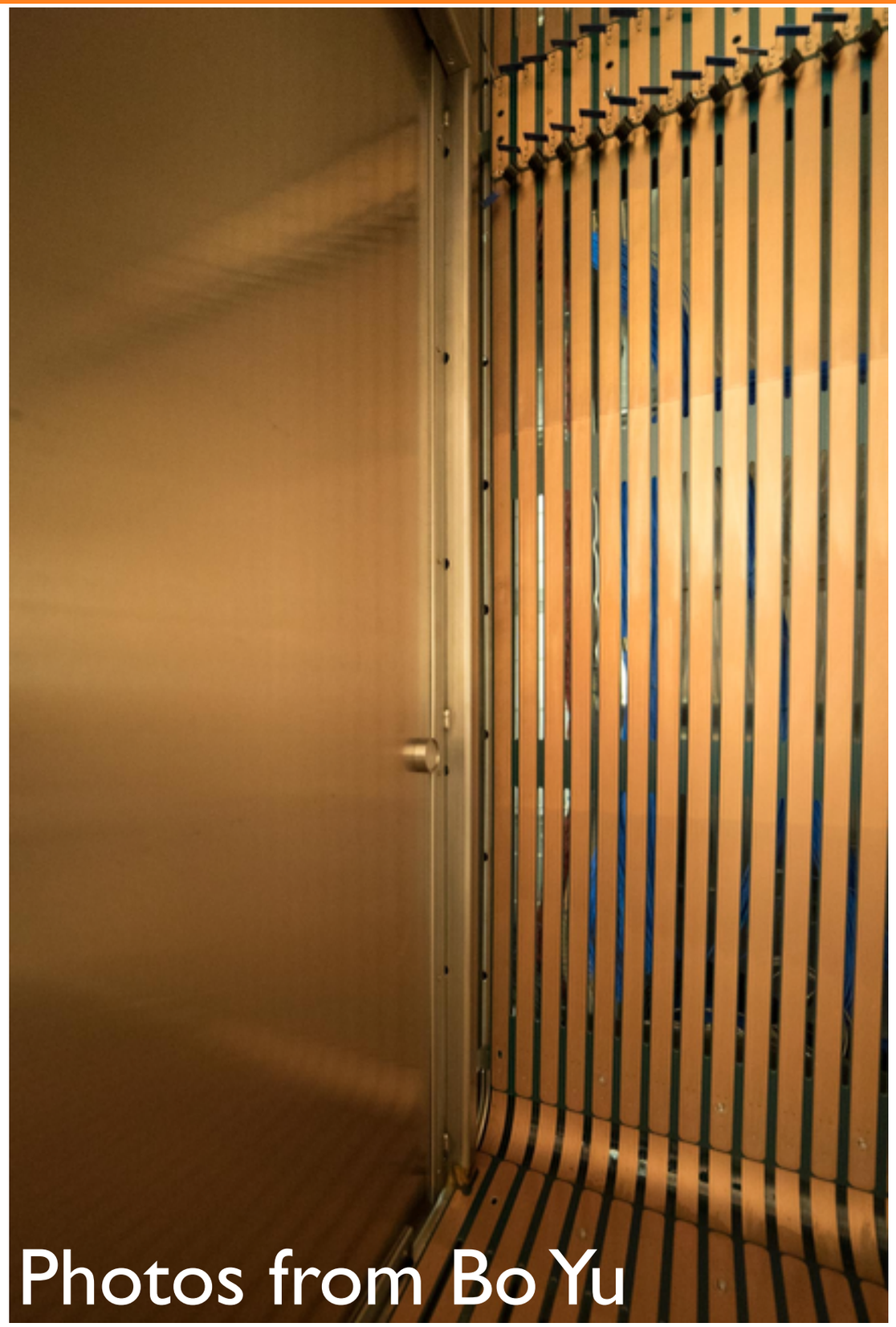

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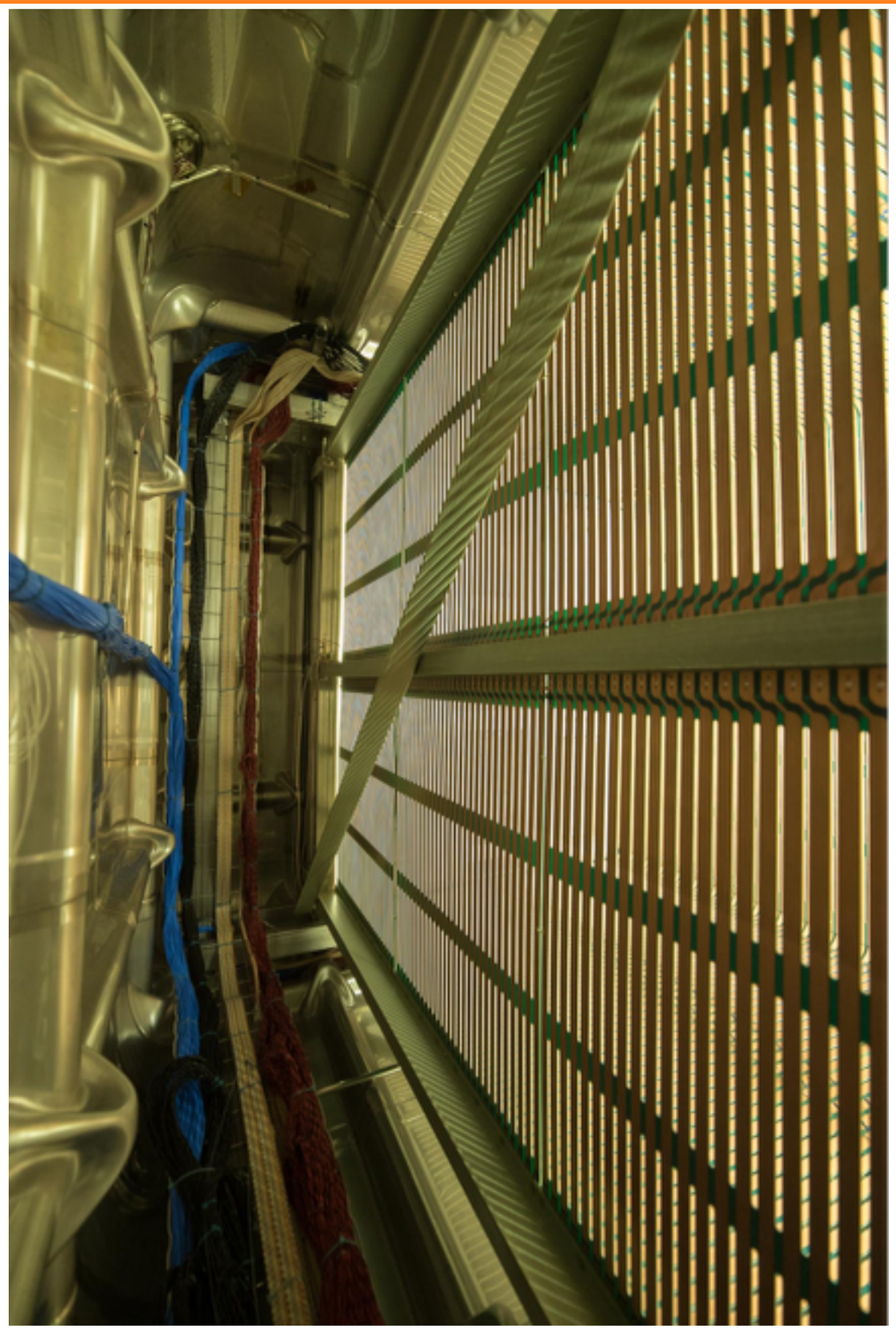

Near Term Activities

- CERN engineer meeting, Nov. 9-12
- APA - continued developed of automated wire-winding apparatus at PSL
- CPA - resistive cathode studies at CERN, material testing at Princeton
- Field-cage - test of roll-formed concept in 50L cryostat at CERN
- Updating of high-level milestones and schedule for FY16/FY17.
- Updating/creating of L3 parameters/requirements
- Continued interactions with other WGs (e.g. - calibrations, detector performance, etc…).
- protoDUNE specific discussions

Opportunities

- Most pressing need is to identify new funding sources (non-DOE) to participate in production of detector elements for DUNE/protoDUNE TPC.
- Second most pressing need is for scientist-power to work on simulation and validation of TPC parameters that have significant impact on design/production (e.g. - wire pitch/angle, etc…). Changes to TPC design have significant cost associated (schedule/resources), so should identify/prioritize any possible changes very soon. Talk by Xin and Tingjun is very timely.
- Smaller-scale opportunities also possible
  - studies of long-term stability of components (resistors, capacitors, etc…) at LAr temperatures.
  - study of boiling/bubbles due to active TPC elements (resistors, capacitors, etc…) during LAr operation.
  - ideas for measuring/surveying TPC wires and interfacing with LArSoft geometry.
  - refining of cold-testing of APAs (e.g. - what to measure during test, what to learn from test, etc…).
  - studies of microphonics/vibration, and how to mitigate.

Opportunities

- New ideas welcome. One lesson from MicroBooNE was occasional need for dedicated teams to focus on detector updates/upgrades as new information became known. For example:
  - addition of surge protection devices to field-cage (http://arxiv.org/abs/1406.5216)
  - replacement of some resistors with more robust versions (http://arxiv.org/abs/1408.4013)
  - wire "stick-tion" under bias voltage conditions.
  - development of scheme for viewing TPC in sealed/inaccessible cryostat (http://arxiv.org/abs/1507.02508)
  - re-working of some field-cage tubes as issues with HV breakdown in highly purified LAr became (re)discovered.