



# Far Detector High Voltage Working Group

## First meeting topics for discussion

- Charge and relation to project
- Work already requested
- Organizing and recruiting volunteers

# Charge (draft)

To establish, maintain, update, and own **requirements** for high voltage.

(Building things not in charge.)

To communicate these **requirements** to the relevant working groups and project elements.

(They build things.)

To follow and assess impacts of any design changes on HV **requirements**.

(We have to keep track of other system's design changes.)

To follow worldwide developments in HV for liquid noble gas TPCs and propagate changes in the state of art to DUNE.

(We have to read papers and keep informed.)

# More to high voltage than the WBS “High Voltage System”

131.02	DUNE	E. James		
131.02.02	Far Detector	Jim Stewart		
131.02.02.02	TPC	Bob Paulos	All TPC components internal to the detector cryostat.	
131.02.02.02.01	APA	Bob Paulos		Near HV
131.02.02.02.02	CPA	Bo Yu		HV
131.02.02.02.03	Field cage	Bo Yu		HV
131.02.02.02.04	Integration	Jack Fowler	All interfaces mechanical and electrical.	Some HV
131.02.02.02.05	TPC HV System	Bo Yu	cathode high voltage system: feedthroughs, cables, filtering, power supplies.	HV
131.*			Anything near the TPC	HV

# Work already requested

- Request from Performance WG
- Request for radiopurity info
- Request from FD coordinator
- Review existing HV R&D plan from LBNE R&D committee, January 2015 ([LBNE-doc-10006](#))
- Request for a list of available LAr HV test chambers

# Performance WG request

Dear Glenn,

... the Far Detector Performance (FDP) Working Group has the responsibility to ensure that the far detector technical requirements reflect the scientific requirements. For example, requirements on energy resolution, energy scale, calibration precision, vertex and tracking precision, cleanliness, timing and so on must be sufficient to achieve the science goals. Likewise, engineers designing the detector need to have a point of contact with the physicists to answer questions on priorities and change requests. Essentially, FDP group will act as a technical board for the far detector(s) that will answer to the Far Detector coordinator and manager.

**We would like you to nominate one person from your group to serve on the FDP board for a period of at least one year (renewable).** This should be a person knowledgeable in your group's area of expertise and able to serve as point of contact at FDP meetings. ... **We would appreciate a nomination from your group before October 11**, as there are issues that require immediate attention.

Best regards,  
Bob, Mayly, Alex

# Request for radiopurity info

- Juergen Reichenbacher (Radiopurity WG deputy) requested info on the radiopurity of candidate materials for the cathode plane array. (E.g., Micarta.)
- The CPA material choice isn't absolutely fixed yet, so I convinced him to work on specifying the radiopurity requirements for the CPA first.
- They'll be back....

# Request from FD Coordinator

Dear Glenn, Emilija, and Shuoxing,

The current thinking of Bo Yu, *et al.*, on the cathode planes for ProtoDUNE differs significantly from the DUNE CD-1R reference design. To provide more protection in the event of a discharge, a high resistivity conducting cathode plane is now envisioned, with the current material choice trade-named Micarta (phenol based) the leading candidate.

Could you **have a look at elements of the HV design** contained in the attached minutes and **determine whether you can deliver**, to the extent possible, an **expert independent opinion** on these plans to the DUNE Far Detector meeting on **Tuesday October 20** between 1000 and 1200 CT?

As well as cathode plane issues, feel free to comment on the ground plane scheme, the field cage design, the HV cup placement, and any other HV issues you deem important. Feel free as well to recommend additional tests that should be performed on any HV system components, and to recommend an appropriate system of HV diagnostics. I encourage you to contact Bo Yu about details, and also independent outside experts ...

Your first report need not be the final word, but it is important to spot any critical problems in the design that may have been missed, especially those that could impact the cryostat construction for ProtoDUNE, for which a tender may be issued by CERN in this calendar year.

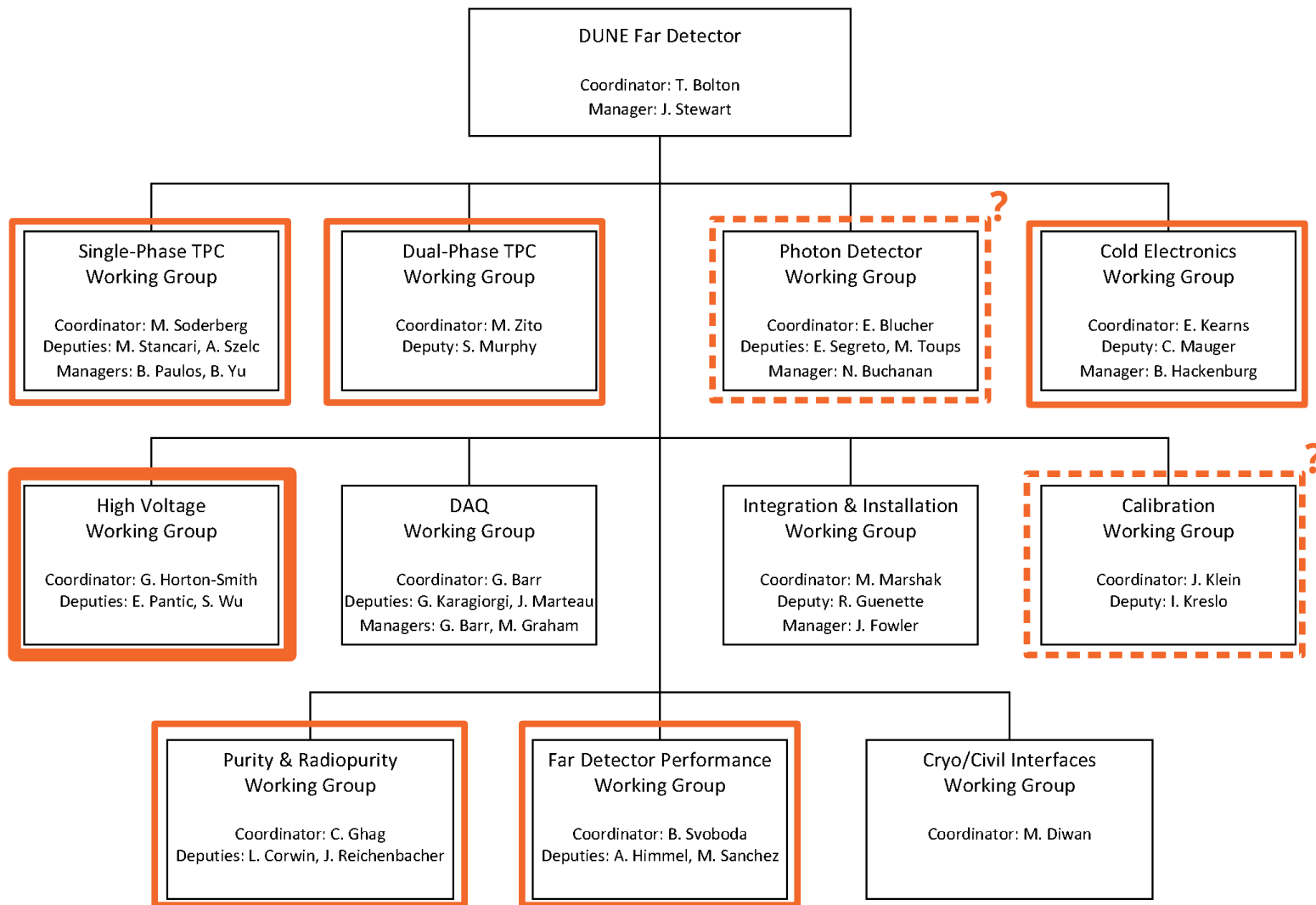
Tim Bolton

# Jan 2015 HV R&D plan from LBNE R&D committee

- Public at [lbne2-docdb.fnal.gov/cgi-bin/ShowDocument?docid=10006](http://lbne2-docdb.fnal.gov/cgi-bin/ShowDocument?docid=10006)
- A number of generic tests, specific design tests, discharge damage tests, and protection system tests given.
- The HV grail would breakdown threshold in LAr as function of electrode feature size, distance, stress area/volume, LAr purity...



# Relevant working groups so far



# Who wants to do what?

- Serve on the FDP board for a year?
- Expert look at ProtoDUNE HV by Oct 20?
- Extract list of tests to do from [LBNE-doc-10006](#)?
- Compile list of LAr HV test facilities?
- Attend a related WG meeting routinely?