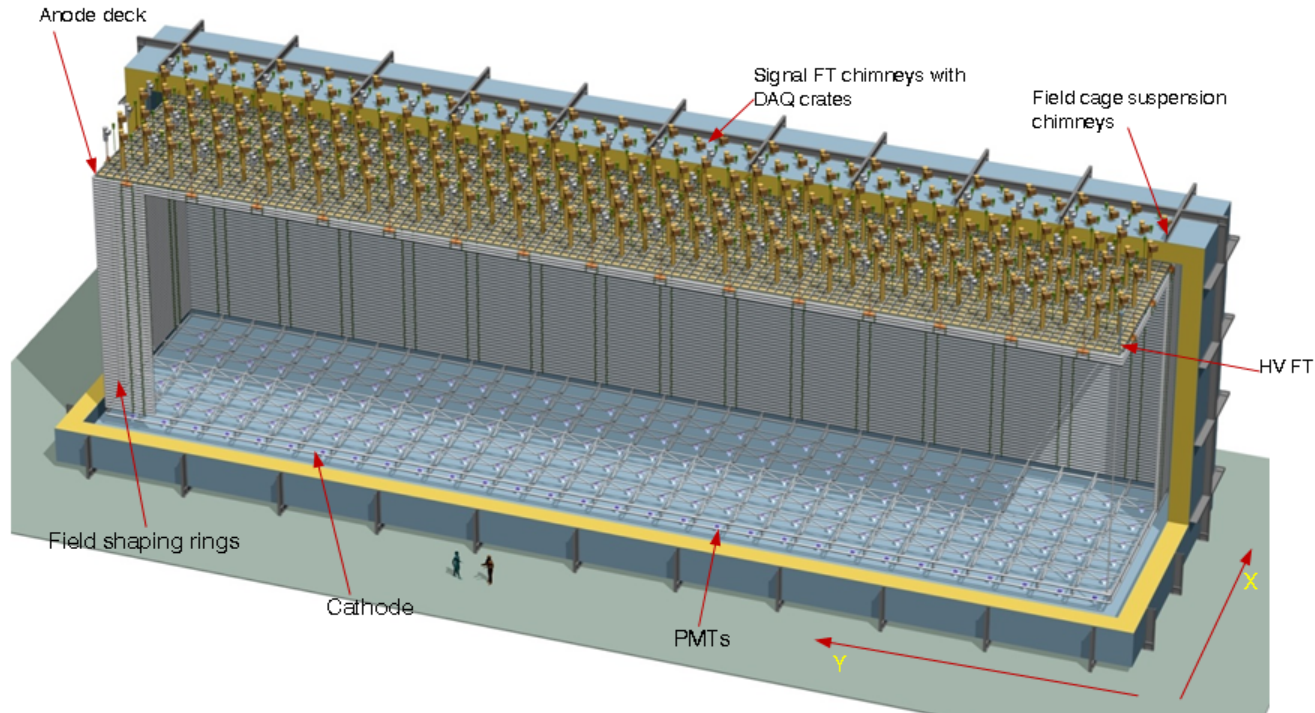


Dual-Phase Photon Detector System

Michel Sorel

DUNE-IFIC Meeting, 2018-10-11

DP-PDS



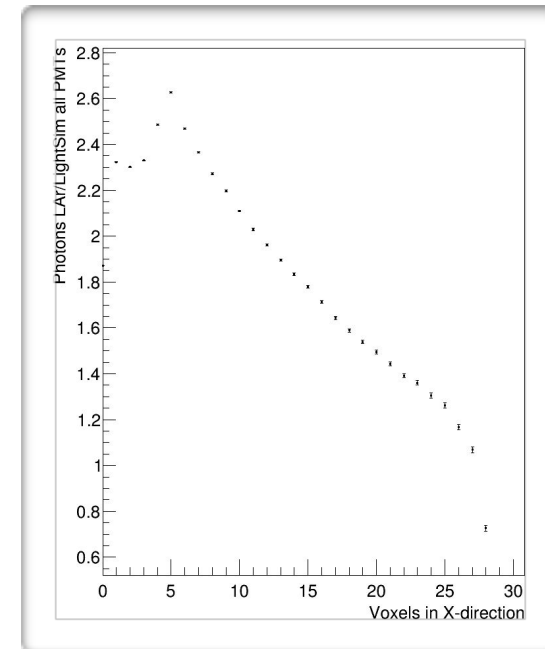
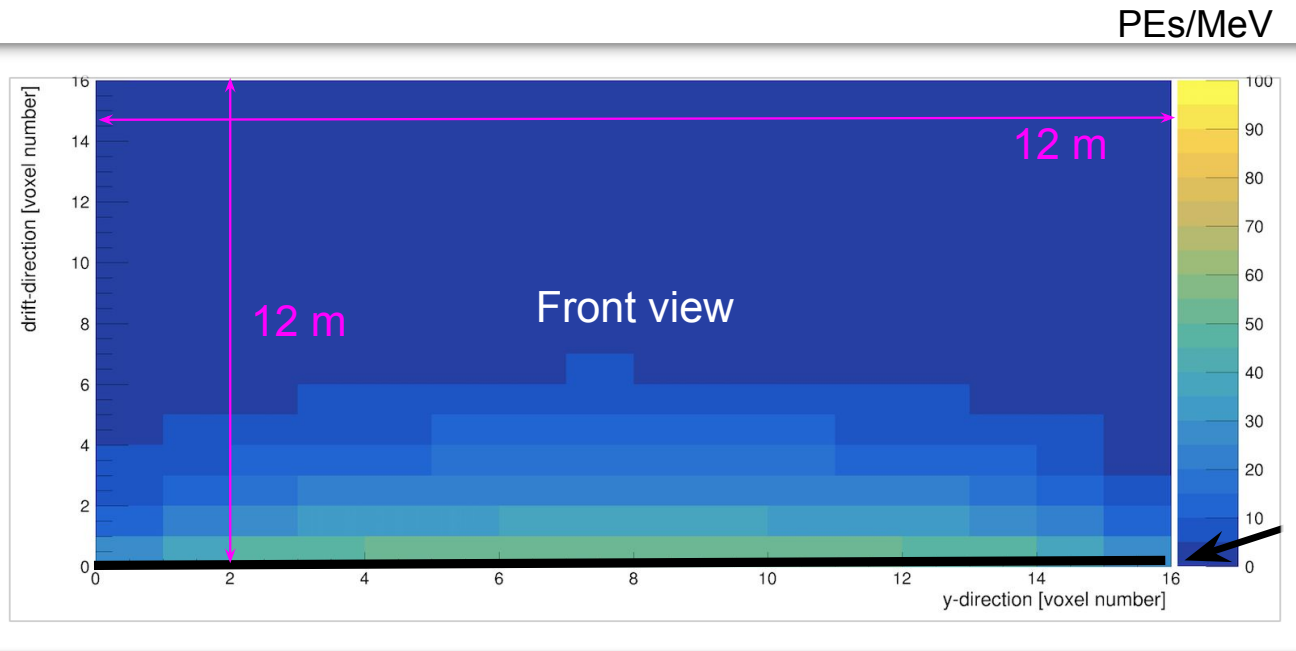
- Photosensor system: 720 PMTs, TPB coated
- Mechanics: PMT support structure, reflector foils?
- Readout electronics: PMT bases, HV/signal splitters, front-end
- Calibration system: LEDs, optical fibers

What for? Requirements and goals

		Supernova Bursts	Nucleon Decays	Atm. Neutrinos	Beam Neutrinos
T0 for	fiducial volume		X	X	
	TPC drift correction	X	X	X	
	sub-ms timing	X			
	Triggering	X	X	X	
	Direct calorimetry	X	X		X
	Position Reconstruction	X	X	X	
	Michel e Detection		X	X	X

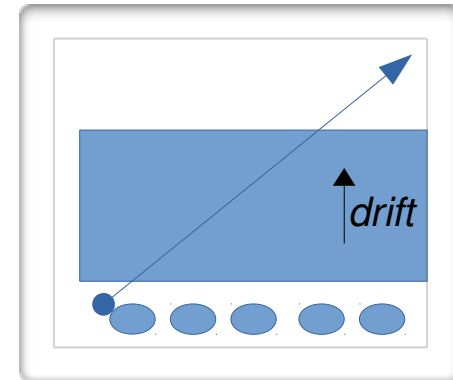
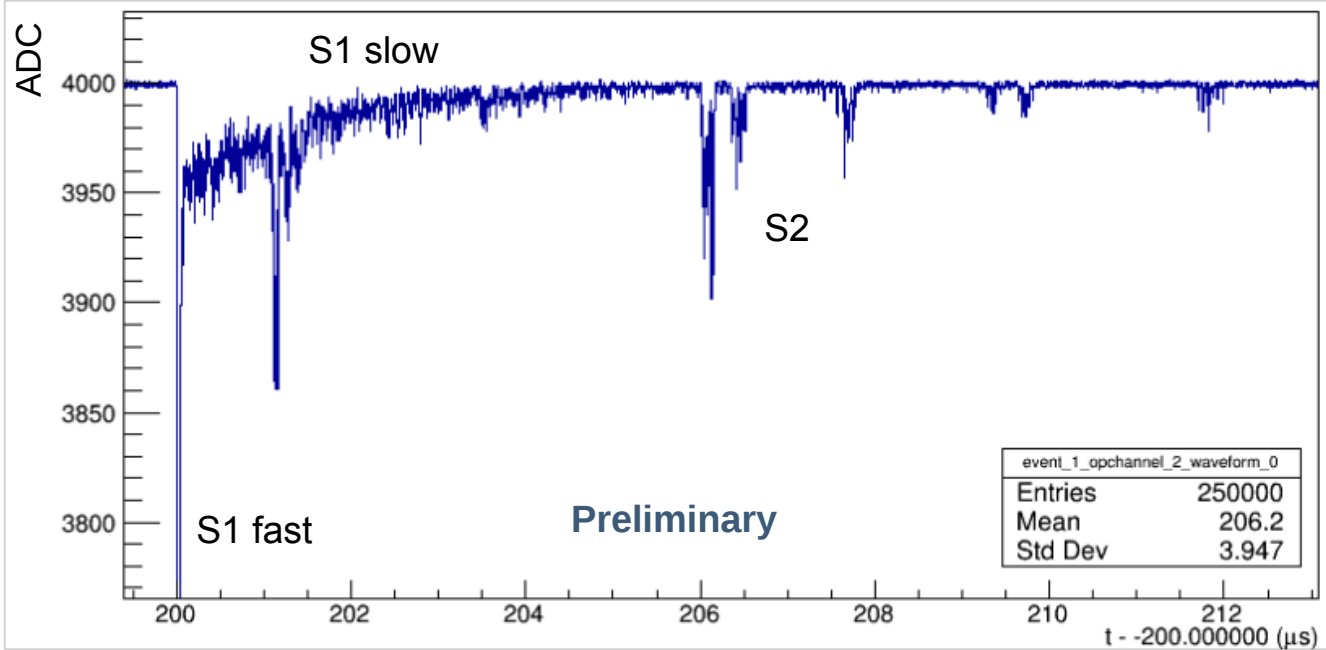
Simulation progress I

- Photon libraries for fast optical simulations:



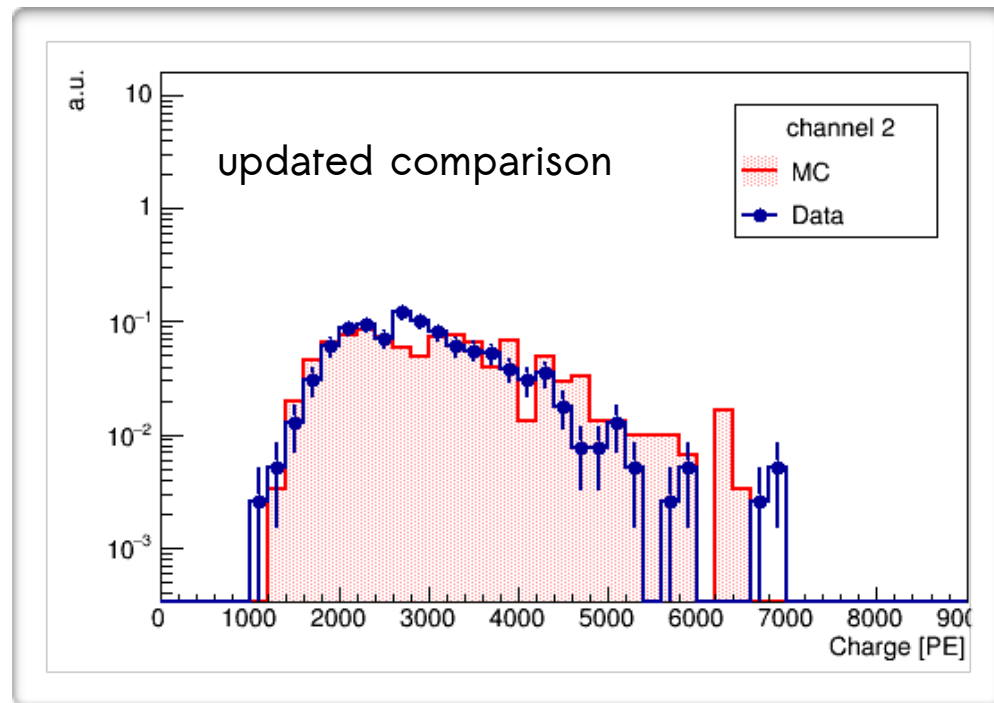
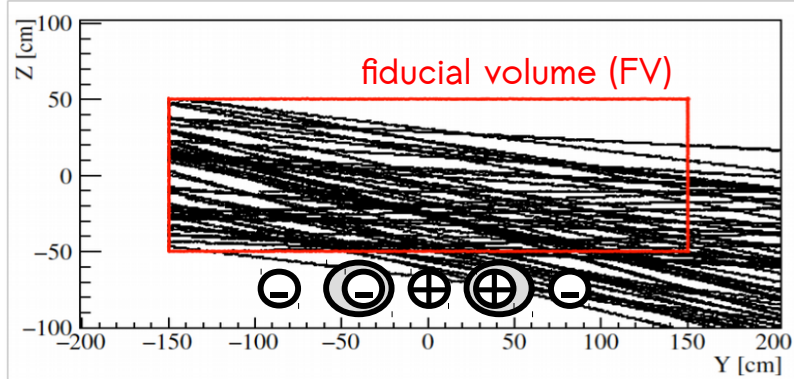
Simulation progress II

- Electronics response:



Data/simulation progress III

- Agreement between 3x1x1 data and simulations:



Plans for TDR studies

Theme	Highest-priority sample	Other samples	Who
PDS triggering	SNB	None	Ana Gallego (CIEMAT)
PDS t0 reconstruction	NDK	Atmospheric v, SNB	Jose Soto (CIEMAT)
PDS calorimetry	Beam v	Atmospheric v, SNB	Bea Tapia (U. Texas)

- Impact on physics from following design variations:
 - Reflector foils yes/no
 - Number and effective area of photo-sensors
 - Transparency of cathode/grids
 - Electronics variations: sampling frequency, dynamic range, noise

Outline for DP-PDS chapter in TDR

Technical Design Report

DUAL PHASE – PHOTON DETECTION SYSTEM

Outline

1. Physics Requirements and Goals
2. Design Overview
3. Photosensor System
4. Mechanics
5. Readout Electronics
6. Calibration System
7. Validation with Data from Photon Detector System Prototypes
8. Baseline Design Validation and Projected Photon Detector Performance
9. Quality Control
10. Interfaces
11. Installation, Integration and Commissioning
12. Safety
13. Project Management