ProtoDUNE Science Workshop - Introduction

Thomas Kutter, LSU
on behalf of the workshop organizers

June 28, 2016

Workshop Goals

- provide well-defined parameters of the beam (particle types, rates, momentum resolution, PID) to execute a successful measurement program

- identify a prioritized list of measurements and analyses and a plan/schedule to develop the required tools and analysis algorithms

- define and discuss benchmark measurements to evaluate the detector performance

→ **emphasize** and **advertise** the scientific measurements protoDUNEs can make

Past Work and ongoing Studies

- A summary task list (thought of so far) available from workshop overview page in googledocs

Task (tentatively subdivided into 3 categories)

ProtoDUNE detector performance & monitoring

Development of calibration procedures and data-MC studies required for FD physics

ProtoDUNE physics

For each task we list

what data is needed	space-charge can affect	beamline/window sensitive	reco tools notes	MCC6 sample available; several samples generated later; Geant4/Corsica/LArSoft used; noted what else needed for development (today all samples have space-charge on/off; no cosmic mu overlayed with beam data yet) MC samples: /mnt/nas00/software/protoDUNE_June_ws

Last (but not least) column:

who would like to work on it? (free to edit)

→ Please visit throughout workshop and add your name

→ Send feedback/comments to Robert (Robert.Sulej@cern.ch)

Some Realities/Challenges

- Need to consider tight budget, schedule and limited manpower

→ Translated by EC into the following constraints
(given to workshop organizers last night !)

ProtoDUNE-SP Muon Tagger

The scope of the muon tagging system will be limited to **two 3 x 3 m^2 panels** providing a trigger for through-going low-angle (near horizontal) cosmic-ray muons. A more extensive system will not be considered due to the increased complexity, cost and effort that would be required.

ProtoDUNE-SP UV Laser System

A UV laser system will **not** be included in the protoDUNE-SP design due to lack of resources to implement the system. In addition, including a uv-laser system would increase the complexity of the design and thus increases the overall technical and schedule risk to the project.

ProtoDUNE-SP Minimum Beam Energy

In order to finalize the beam line design, the minimum beam momentum for protoDUNE-SP is assumed to be **1 GeV**. A minimum momentum of 500 MeV would be considered only if a strong physics case is made during the protoDUNE physics workshop at the end of June.

More Realities/Challenges

ProtoDUNE-SP DAQ/Computing Assumptions

ProtoDUNE-SP will operate with triggered readout (beam and cosmic-ray). In order to design the system the following parameters will be assumed:

Parameter	Assumption	Maximum
Trigger Rate	25 Hz	50 or 100 Hz
Raw Event Size	230 MBytes	
Lossless compression factor	4	
Beam duty cycle	0.2	
Days of operation in 2018	60	
Storage	1.5 PBytes	2.5 PBytes
Instantaneous Rate	2.3 Gbps	10 Gbps
Local Storage	3 days of data	

The assumed parameters would result in approximately **25 million beam triggers in 60 live-days** of operation, requiring 1.5 PB of storage. Unless there are strong cost arguments, the system will be designed to accommodate the "maximum" scenario. This gives almost a factor two headroom.

Our task:

→ Seriously consider the above constraints and provide compelling arguments if modifications should be made

Workshop Format & Expected Outcomes

Day 1+2:

- Presentations + Lots of discussion
- → gradually getting more technical with instructions

Day 3:

- Start hands-on work on tasks
- Summary discussion

→ Short written report addressing findings/conclusions addressing goals stated on earlier slide

Hands on Session

- Need CERN account to access the Neutrino Computing Cluster at CERN.
- Nektarios Benekos will say a few words about cluster at CERN before start of hands on session on Thursday but try to login asap to avoid last minute complications:

  local > ssh username@lxplus.cern.ch (only when offsite)
  lxplus > ssh username@neut.cern.ch

- Instructions how to work with LArSoft: https://twiki.cern.ch/twiki/bin/view/CENF/LArSoftNeutrinoCluster
- remember: your working directory is **/mnt/nas00/users/username**
  pull packages to this directory (otherwise you run out of the space quickly!)
- MC samples: /mnt/nas00/software/protoDUNE_June_ws
- Problems with LArSoft installation or accessing cluster should be reported to neutplatform.support@cern.ch.

In case you do not have user CERN account please follow the instructions: **http://cenf.web.cern.ch/basic/registration-procedure**

Today: Tuesday June 28th

Group photo during afternoon coffee break ~ 15:15

Outside: detailed location TBA

Social dinner: Wednesday evening ~ 7:00pm

Please Compose Your Own Menu . . .

« Mise en Bouche »

Starter
- Classical Duck « Foie Gras », **or**
- Terrine de Lapereau au Bleu de Gex, **or**
- Hot Asparagus and Mousseline Sauce, **or**
- Mixed Vegetables Salad, **or**
- Fried « Foie Gras » and Raspberry Vinegar

Main Course
- Beef Fillet, Garlic Creamy Sauce, Röstis, **or**
- Chicken Fillet, Morrels and Mashed Potatoes, **or**
- Spring Vegetables, Tajine Style, **or**
- Omble Chevalier Fillet , Saffron Sauce

Assortment of Cheese

Desserts
- Fresh Fruits, Minestrone Style, **or**
- Home Made Ice Cream Mousse, **or**
- Chocolate and Caramel Tartlet, **or**
- Ice or Sorbet

In order to ensure the satisfaction
of small groups of guests,
we suggest that you create your own menu
from the following options

Menu Coquelet :	**38,- €**	**(1 Starter, 1 Dish, 1 Dessert)**
Menu Coq :	**44,- €**	(1 Starter, 1 Dish, Cheese , Dessert)
Menu Coq Rouge:	**56- €**	(2 Starters, 1 Dish, Cheese, Dessert)

Optional : « LE FORFAIT SANS SOUCI »

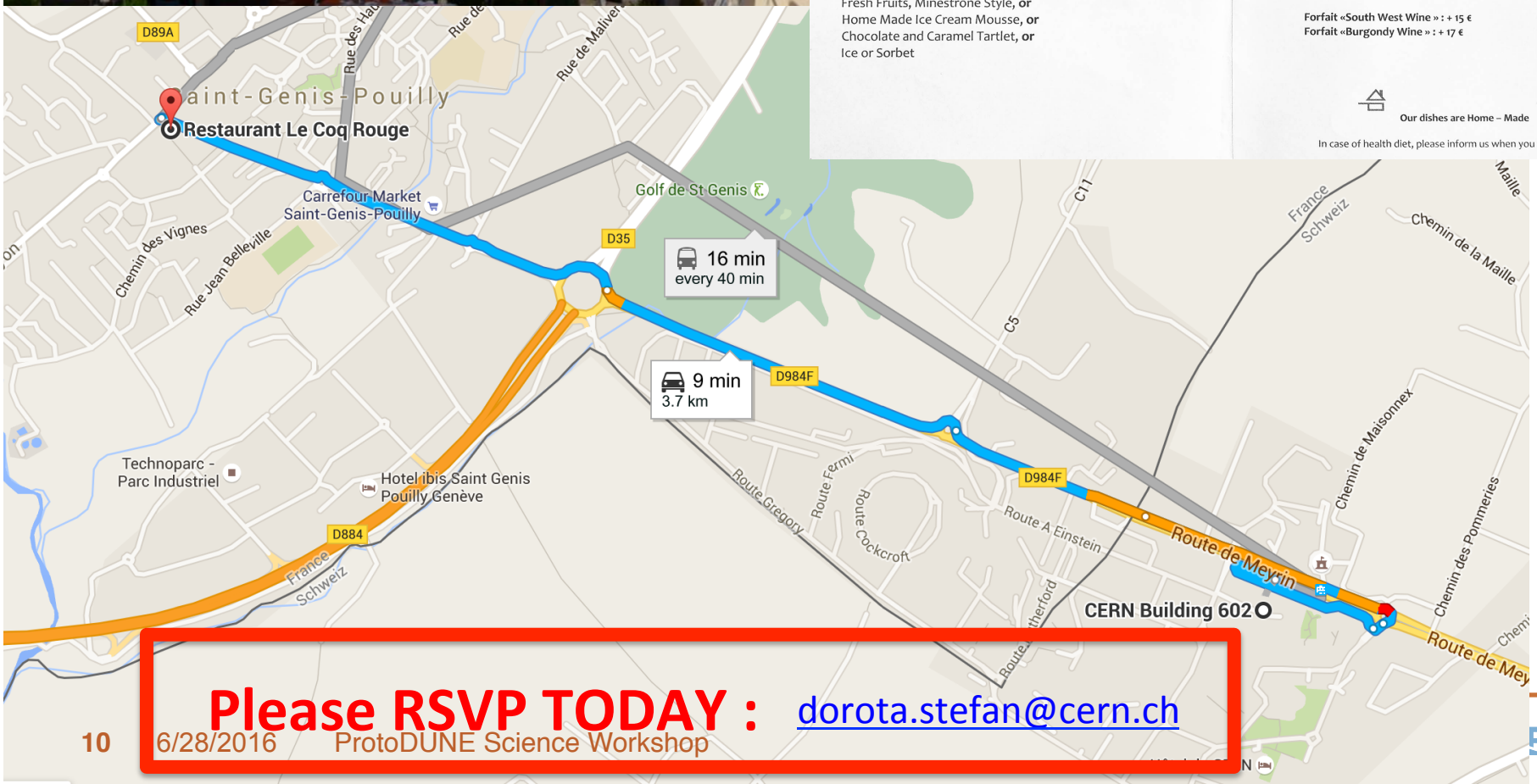
For each person, it includes
- Apéritif maison
- 1/2 btl of wine from the south west of France or Burgondy
- 1 coffee « Réserve du Coq » (100 % arabica)

Tap and Fizzy waters are included

Forfait «South West Wine » : + 15 €
Forfait «Burgondy Wine » : + 17 €

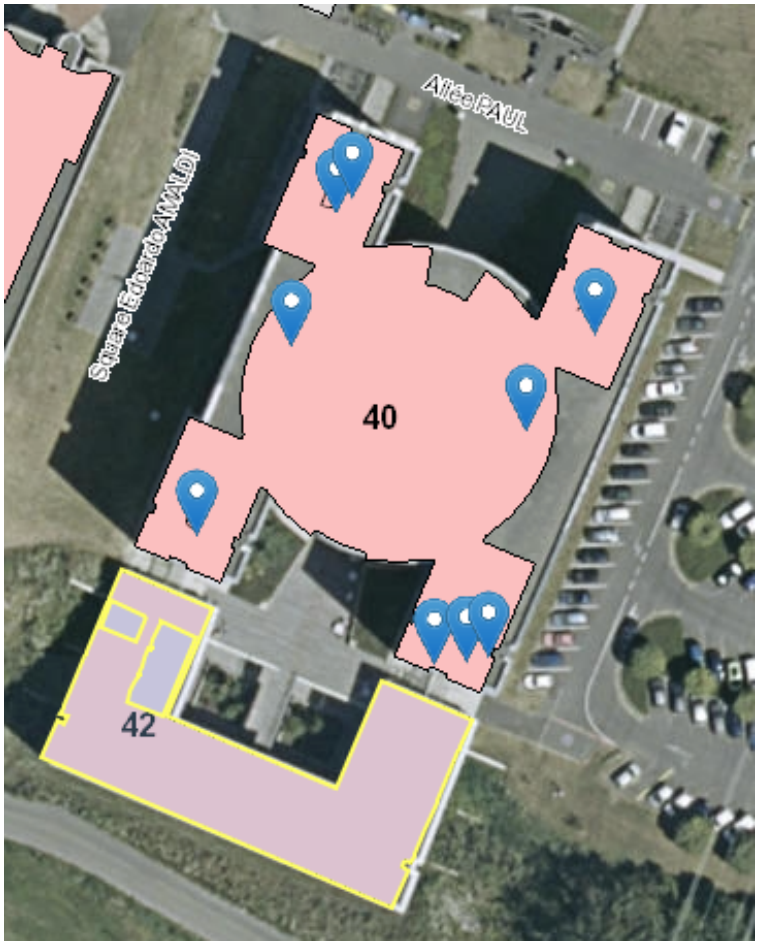
Our dishes are Home – Made

In case of health diet, please inform us when you order your menu



Please RSVP TODAY : dorota.stefan@cern.ch

Wednesday + Thursday
Meeting room: 42/3-002



Let's have good discussions and an enjoyable workshop

organizers:

Stefania Bordoni
Audrey Deidda
Thomas Kutter
Cheng-Ju Lin
Donna Naples
Jarek Nowak
Dorota Stefan
Robert Sulej
Elizabeth Worcester
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