UNIVERSITÉ DE GENÈVE

FACULTÉ DES SCIENCES

Summary of physics session

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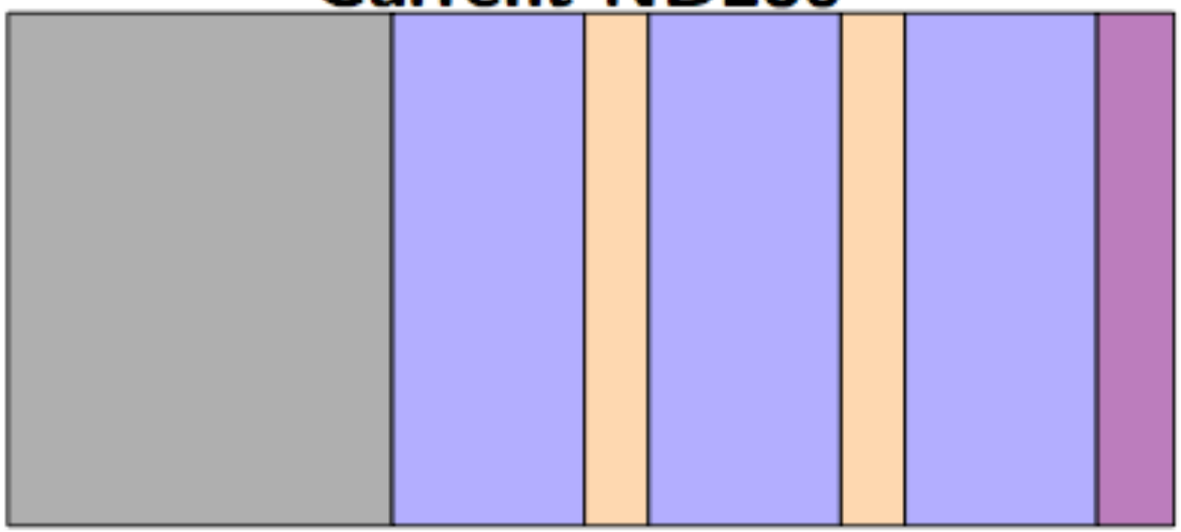
"Neutrino Near Detectors based of gas TPCs" worshop, CERN

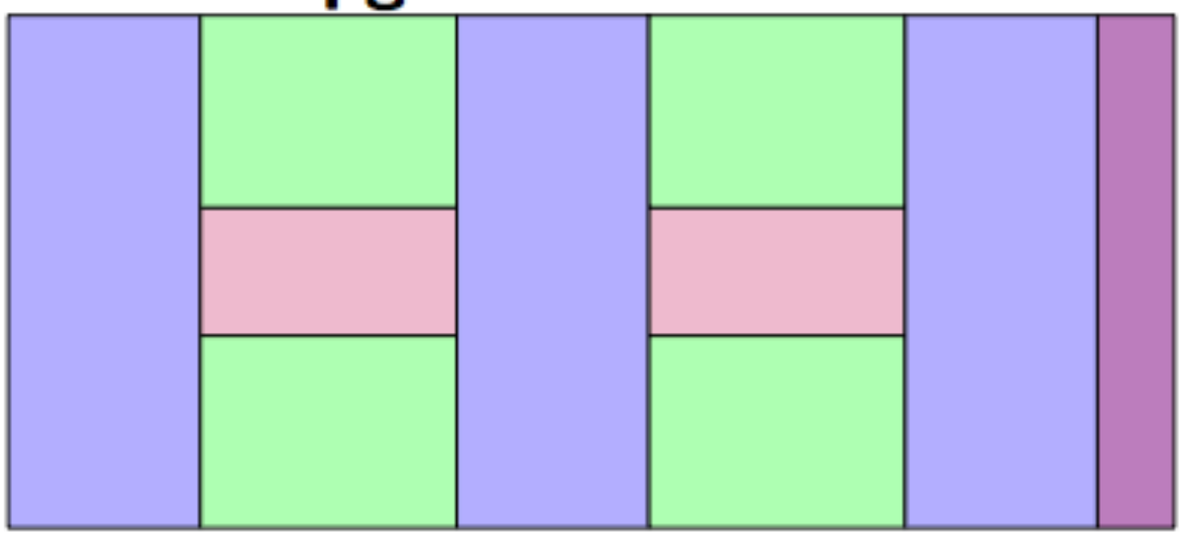
March 21 2017

Detector simulations

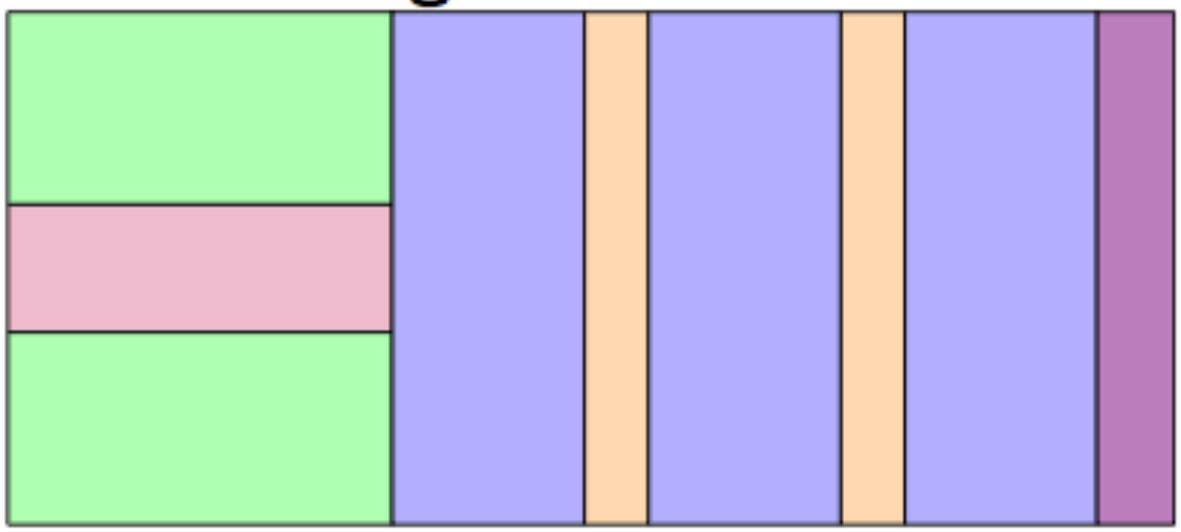
Current ND280



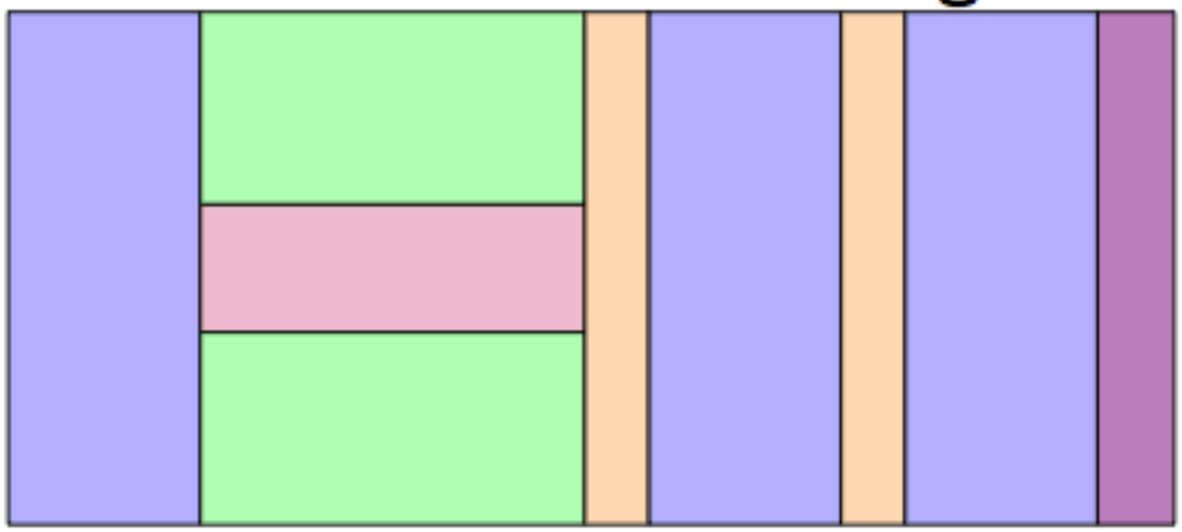
Upgrade reference



Alt.: Target → Fwd TPC 1



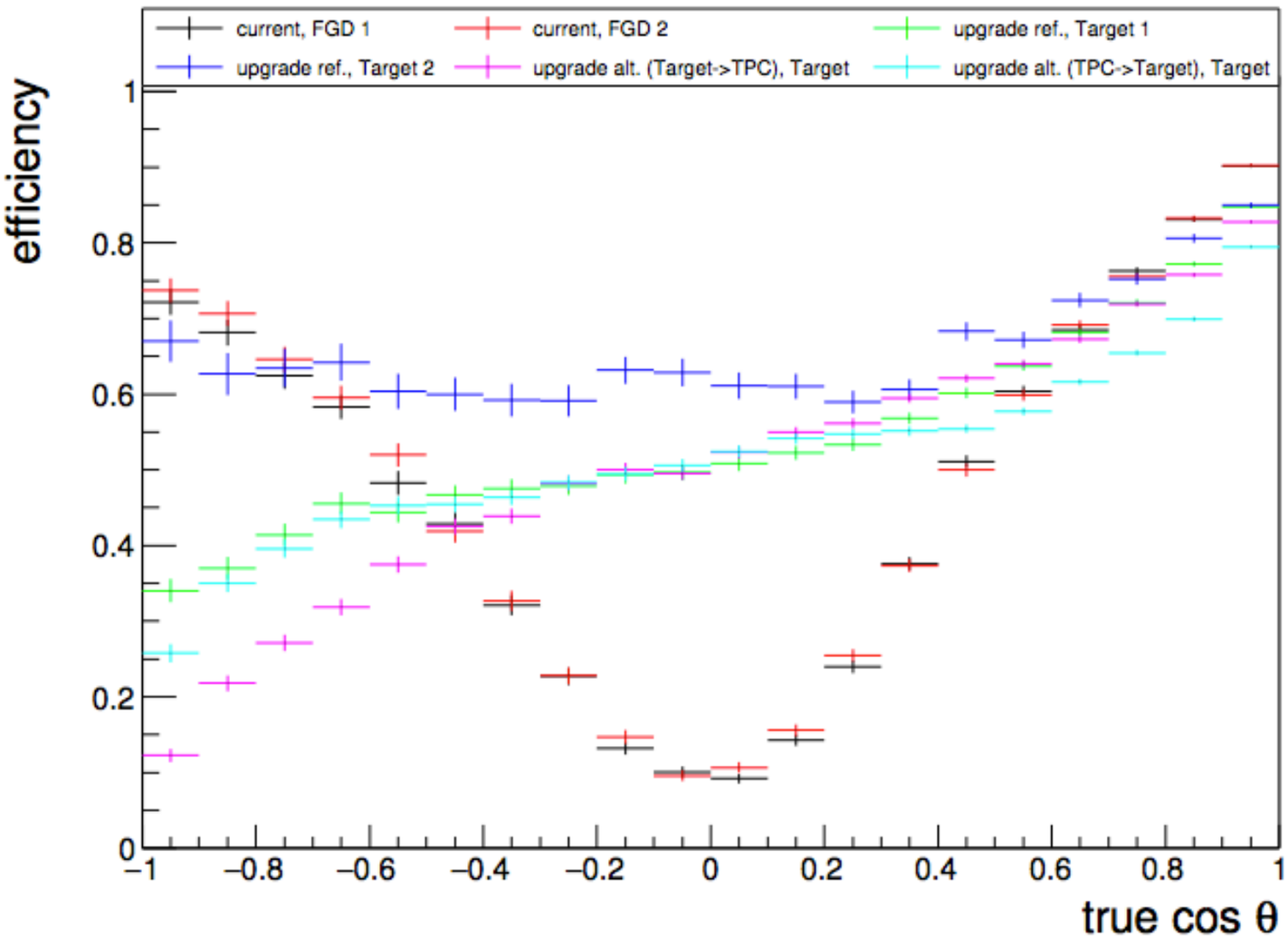
Alt.: Fwd TPC 1 → Target



Legend: WAGASCI-like target, FGD, VTPC, HTPC, P0D, DsECal

Optimization of detector configurations

- We are comparing different ND280 upgrade configurations

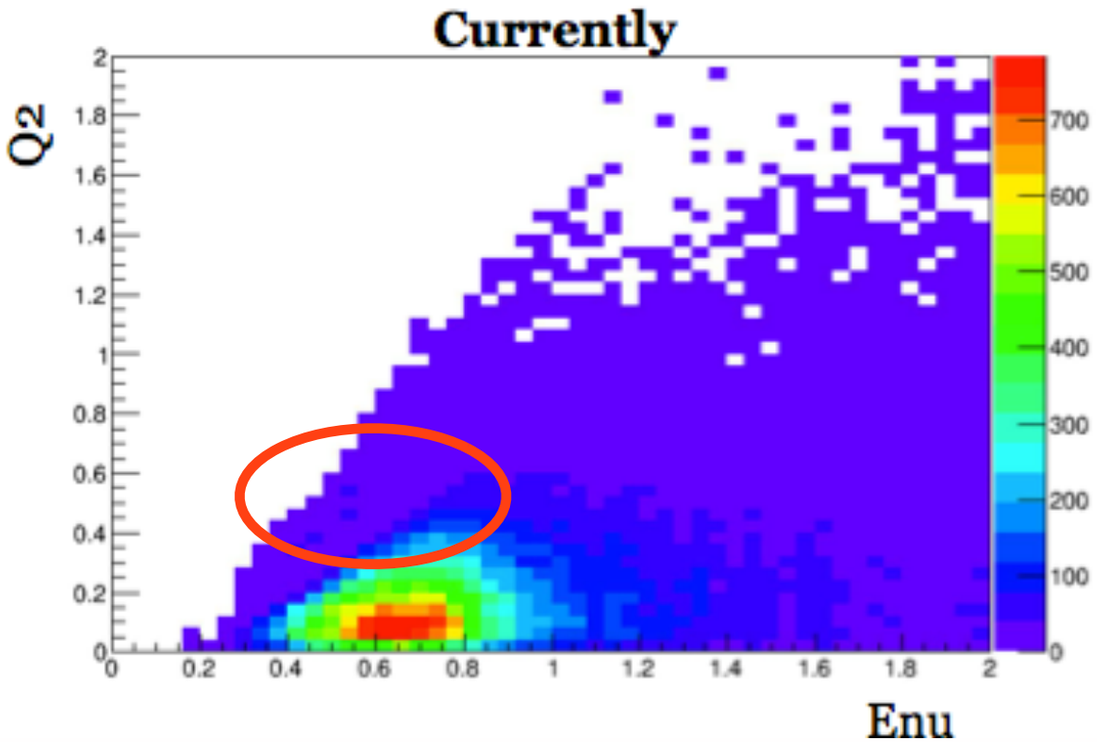


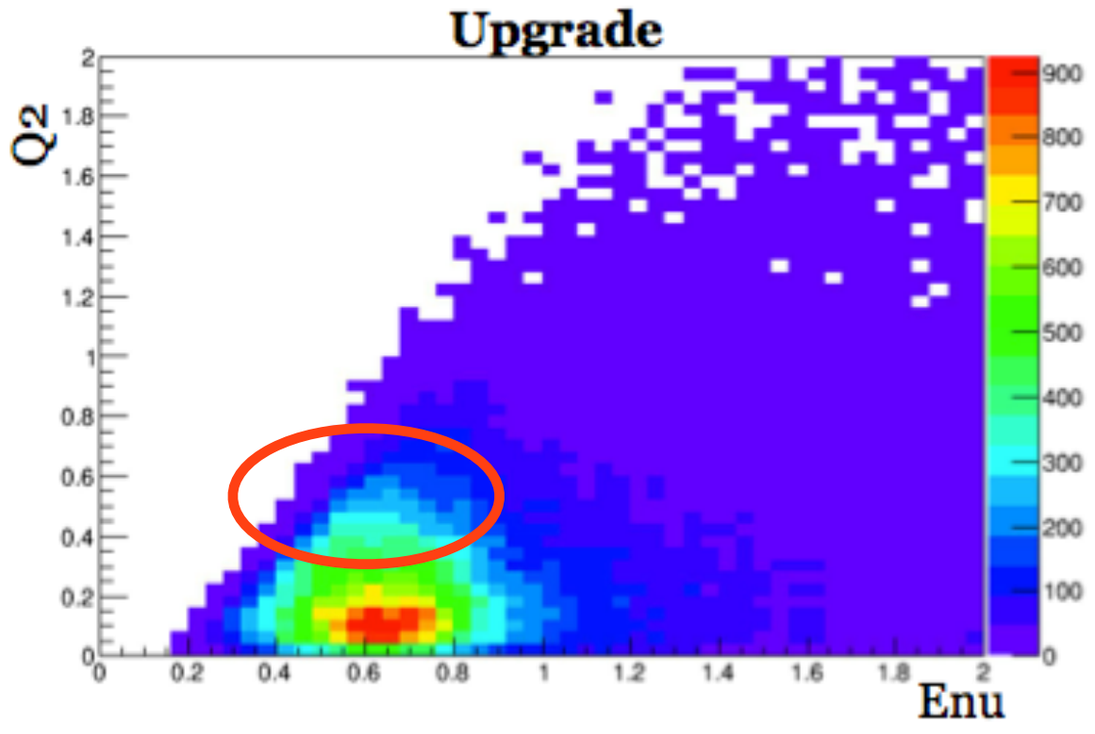
When applying CC-0π selection, what is the composition of events?

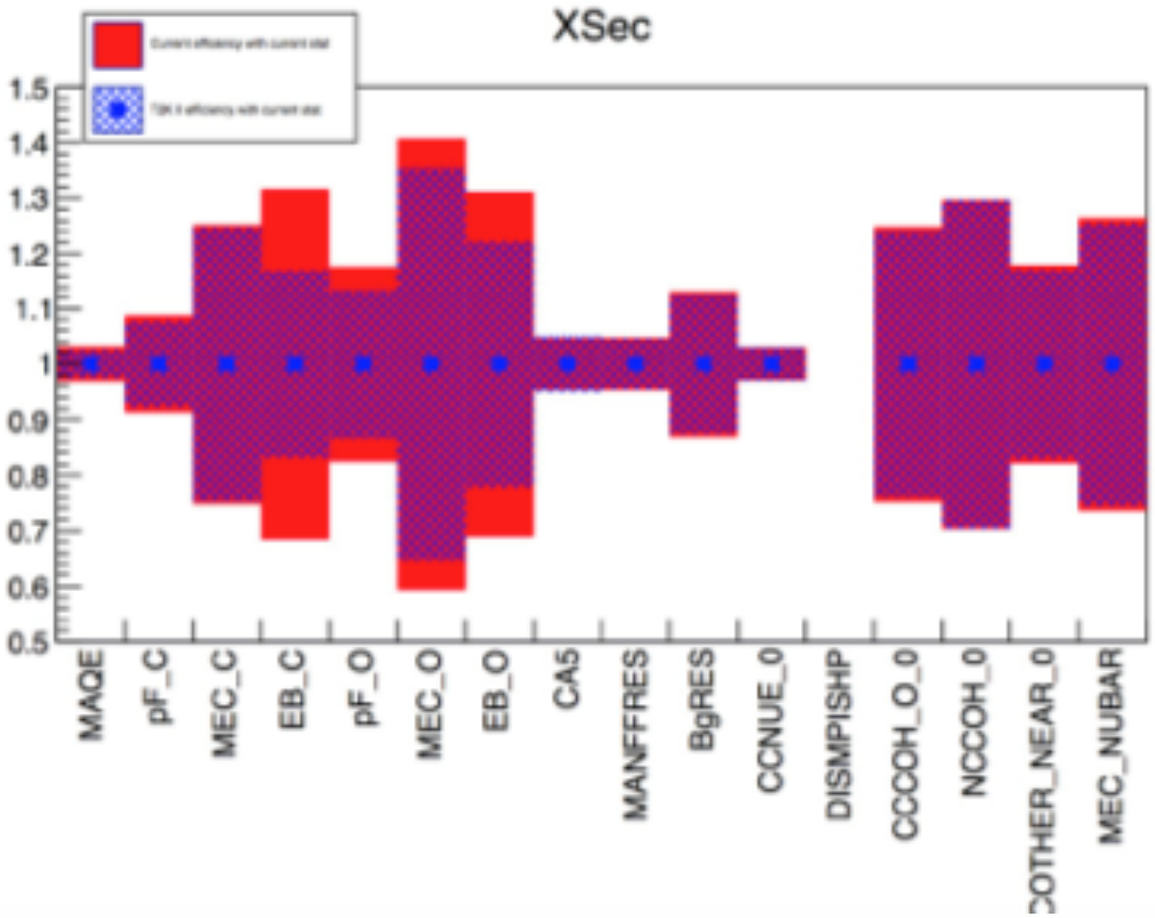
	%	CC-0π	CC-1π	CC-oth	BKG
current	FGD 1	**84.7**	3.06	9.14	3.06
	FGD 2	**85.3**	3.03	8.59	3.08
reference	Tgt 1	**89.7**	2.05	6.57	1.64
	Tgt 2	**87.9**	1.29	8.1	2.75
alt. Target(60cm)→TPC	FGD 1	**85.1**	2.76	9.24	2.88
	FGD 2	**85.3**	3.04	8.8	2.9
	Tgt 1	**89.6**	2.08	6.86	1.5
alt. TPC→Target(60cm)	FGD 1	**85.1**	2.89	9.13	2.85
	FGD 2	**85.4**	3.01	8.64	2.94
	Tgt 1	**88.9**	2.14	7.33	1.64

- Add ToF informations to the event sample selection
- Continue studies to define requirements for the target (Michel e^- efficiency, PID, granularity, etc...)
- Test transverse kinematic with ND280 upgrade

Impact of ND280 upgrade







- MAQE parameter is the only one dependent on Q^2 in current xsec model
- ND280 upgrade-like configuration reduces its error by ~25%
- Work is ongoing to update the xsec model parametrization: more parameters dependent on Q^2 are needed and will be tested
- First studies on oscillation analyses were performed

Future plan

• Optimize the geometry of the new tracker (mass, length, etc...) and define the optimal configuration (reference or alternative?)

• Finalize ToF studies: optimize the geometry based on track reconstruction, PID and Out-of-FV rejection

• Study of nue selection and gamma rejection

• Study of alternative neutrino target detectors: define the requirements by making different assumptions on granularity, PID, Michel e^-...

• Study of Carbon to Oxygen ratio measurement

• Sensitivity studies based on a more precise Q^2 cross-section parametrization: fit@ND280, extrapolate at Super-Kamiokande and perform sensitivity to oscillation parameters

• Complete the fakedata studies

• Manpower is welcome! Let us know if you are interesting to join the physics studies

BACKUP