CALO5D updates: s̄s analysis & other stuff
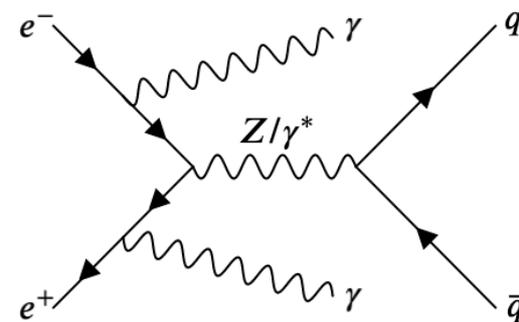
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26/09/25

(b & c) diquark production in e⁻ e⁺ collisions

- MC simulations at 250.
  - International Linear Collider (ILC) run plan.
  - Full simulation of the International Large Detector (ILD).
- Topology: Two back-to-back jets.
- Procedure:

R_q
  - Background suppression → Selection of $q\bar{q}$ events.
  - Flavor tagging → Selection of $b\bar{b}$ & $c\bar{c}$ events.
    - Double tagging (b-tag, c-tag).

A_{FB}
  - Charge measurement → Quark-Antiquark identification.
    - Double charge.
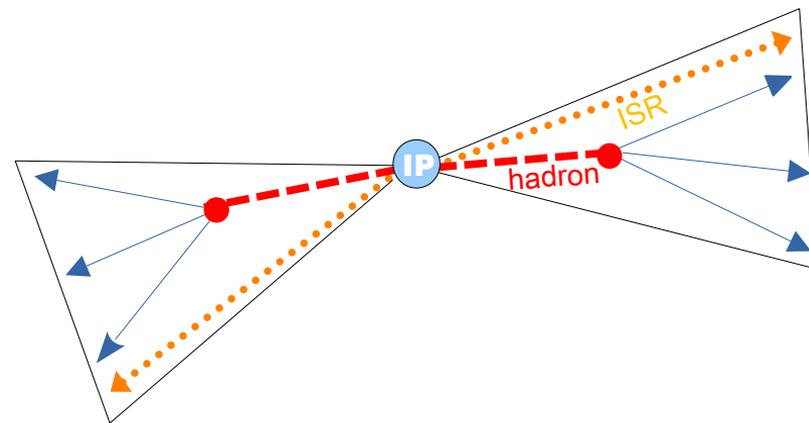
How can we move from here to strange quarks (or u/d quarks)?

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From b/c to strange quark

- Flavor tagging of b and c jets is "easy":

  ◦ Distance ($\tau_q \cdot c$) from the IP is key for b and c quark ID: Displaced vertexes.
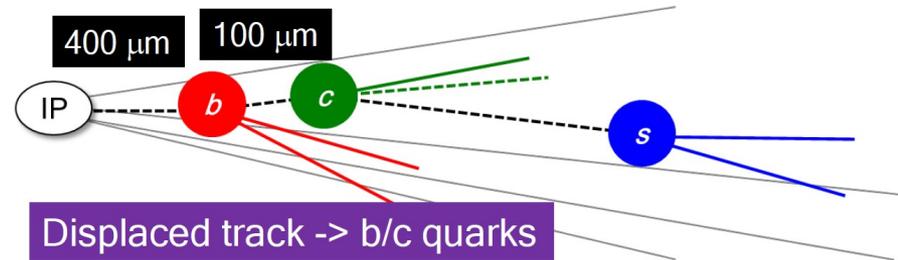
- But the strange quark produce kaons... no decays in the tracker to be used

  ◦ We need to build/use an s-tag relying on kaons PID

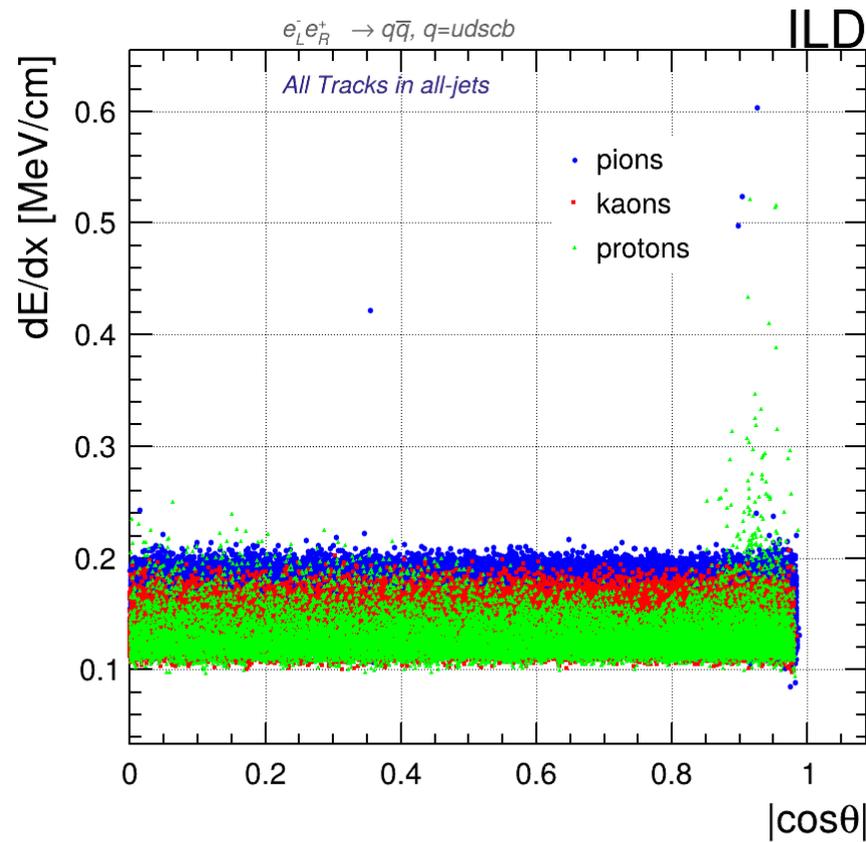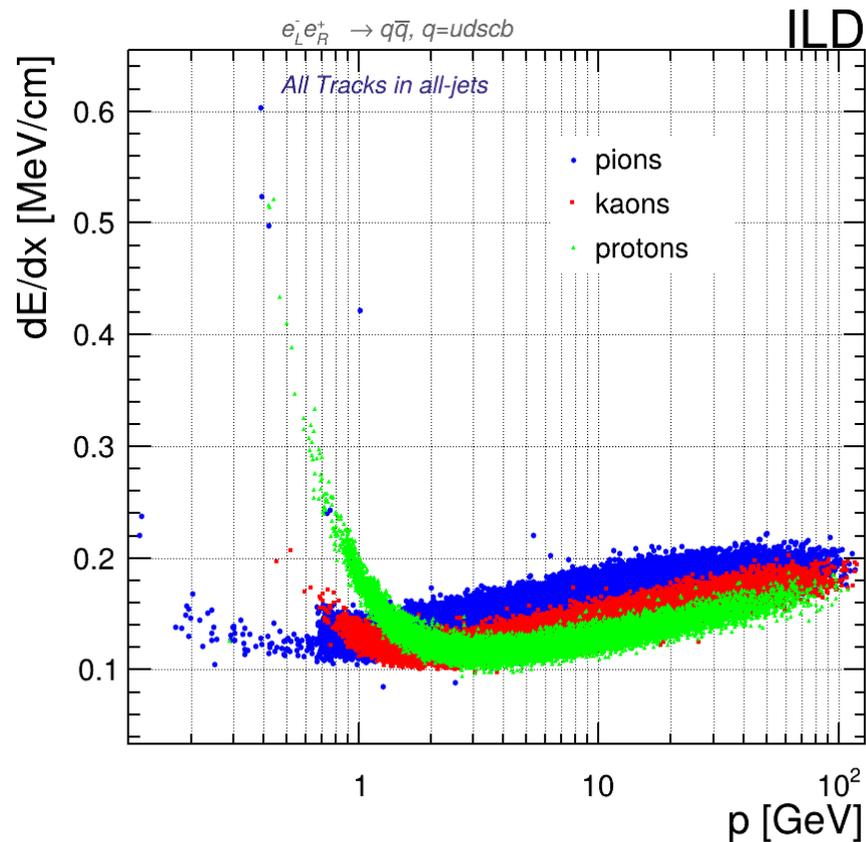   ‣ Our first attempt is a "classic" cut-based analysis

Redoing of the ssbarAnalysis

- Reimplementing the cuts that are missing in the analysis before moving to a similar analysis with dN/dx and ideal PID

#	Name	Quantity	Description
1	b-tag	$btag < 0.3$	Reject events with b-like jets
2	c-tag	$btag < 0.65$	Reject events with b-like jets
3	nvtx	$nvtx = 1$	Jets should have only PV as vertex
4	Leading momentum	$p_{LPFO} > 15\,\text{GeV}$	Leading momentum cut
5	LPFO acollinearity	$\cos\theta_{LPFO_{1,2}} > 0.97$	LPFOs should be back-to-back
6	Offset	$V_0 = \sqrt{d_0^2 + z_0^2} < 1\,\text{mm}$	Offset cut to reject Λ_0 contribution
7a	dE/dx PID (π)		$\pi^{\pm}$ identification
7b	dE/dx PID (K)		$K^{\pm}$ identification
8	SPFO	Veto $p_{SPFO} > 10\,\text{GeV}$ and charge opposite to LPFO.	Attenuate the charge migration by rejecting oppositely charge LPFO competitor
9	Charge	$Q_{LPFO1} \times Q_{LPFO2} < 0$ opposite charge.	Charge of LPFOs from both sides has

uds selection (rows 1-3)

Cut-based s-tag (or ud-tag) (rows 4-7b)

Migration correction (rows 8-9)

New angular k-distance cuts

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PID via dE/dx: Starting point

- Not all tracks/PFOs are valid for dE/dx

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- These three bands can be used to measure an statistical distance

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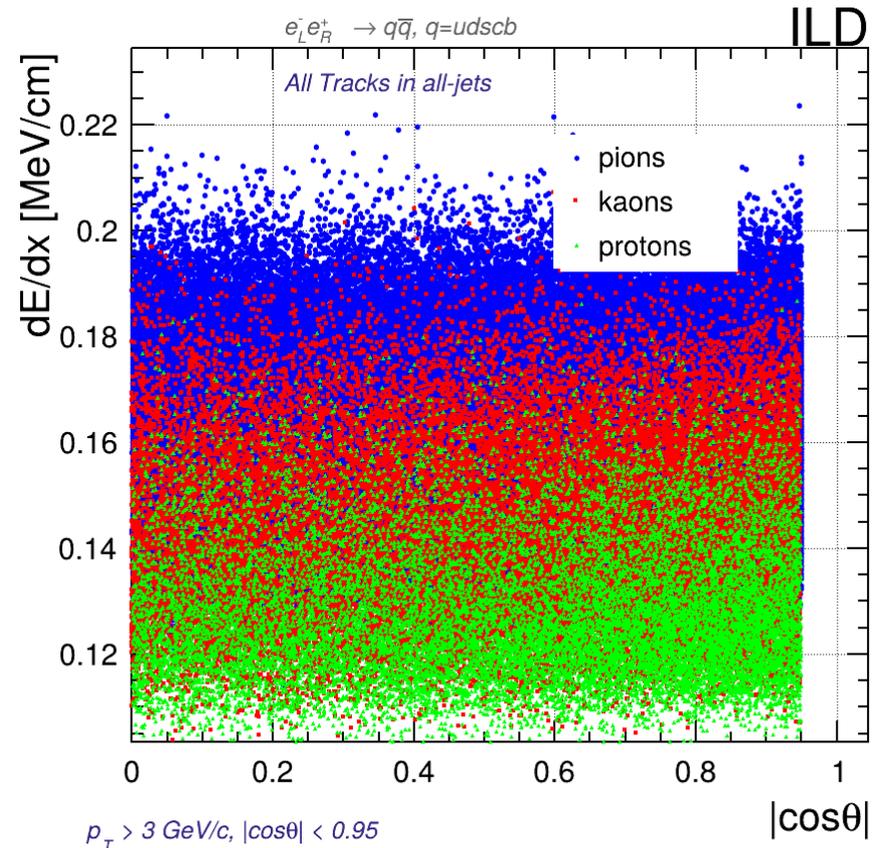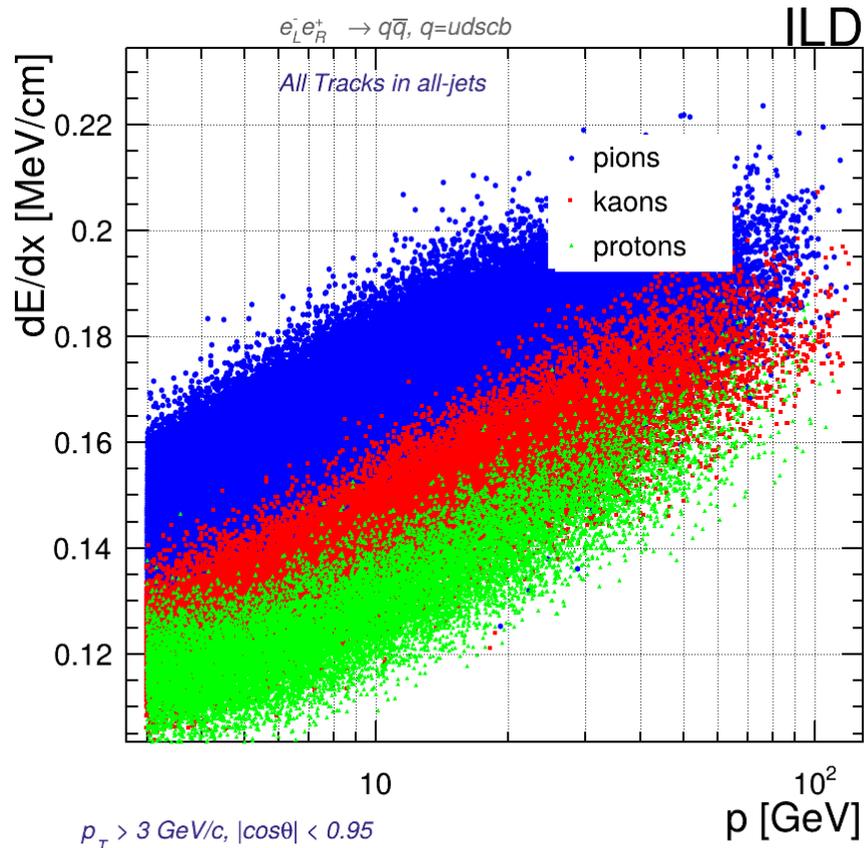
s vs ud: k-distance of tracks

- Example of distance from tracks dE/dx and the theoretical values for kaons

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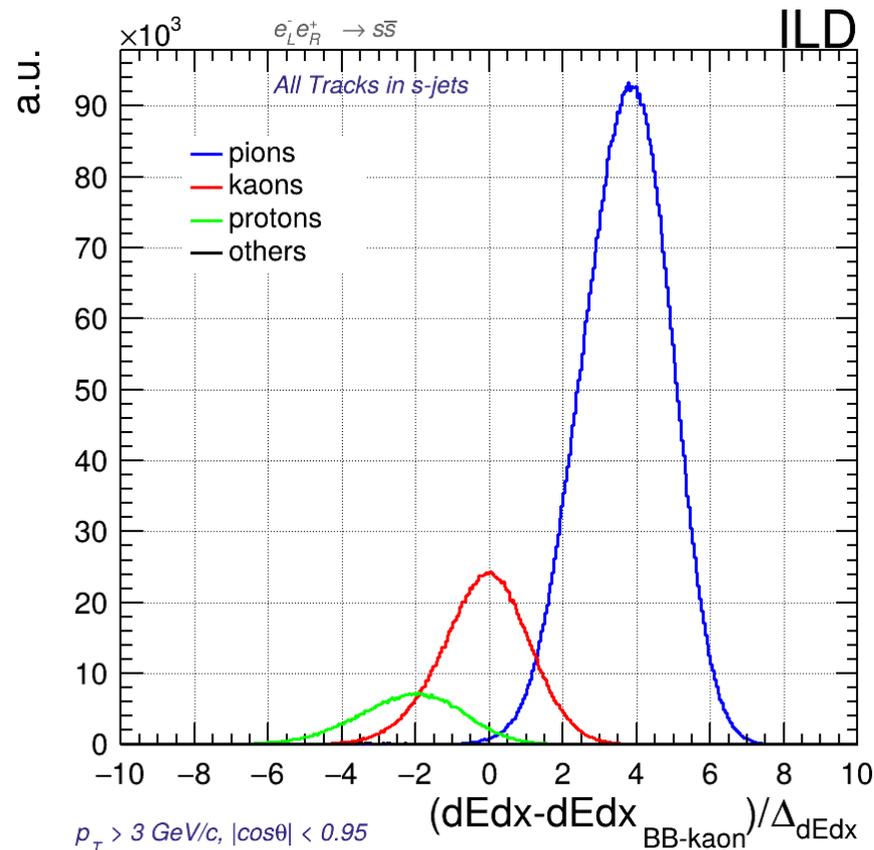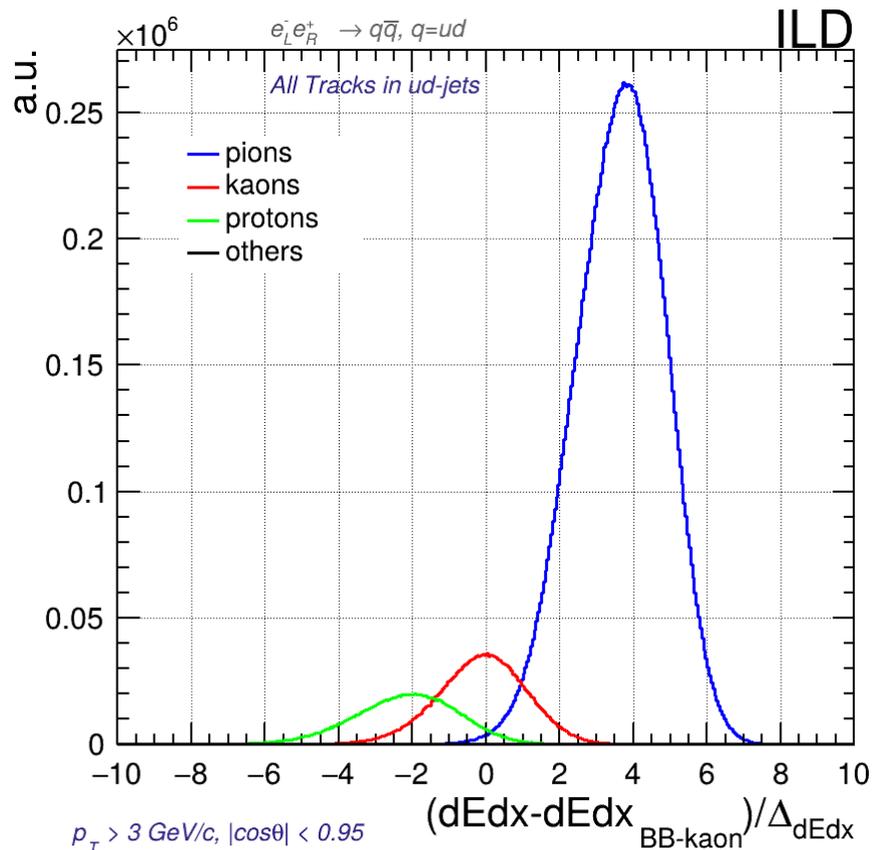
s vs ud: leading charged hadrons

- Inspecting the leading track really shows the difference between s-jets and u/d-jets

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s vs ud: leading charged hadrons

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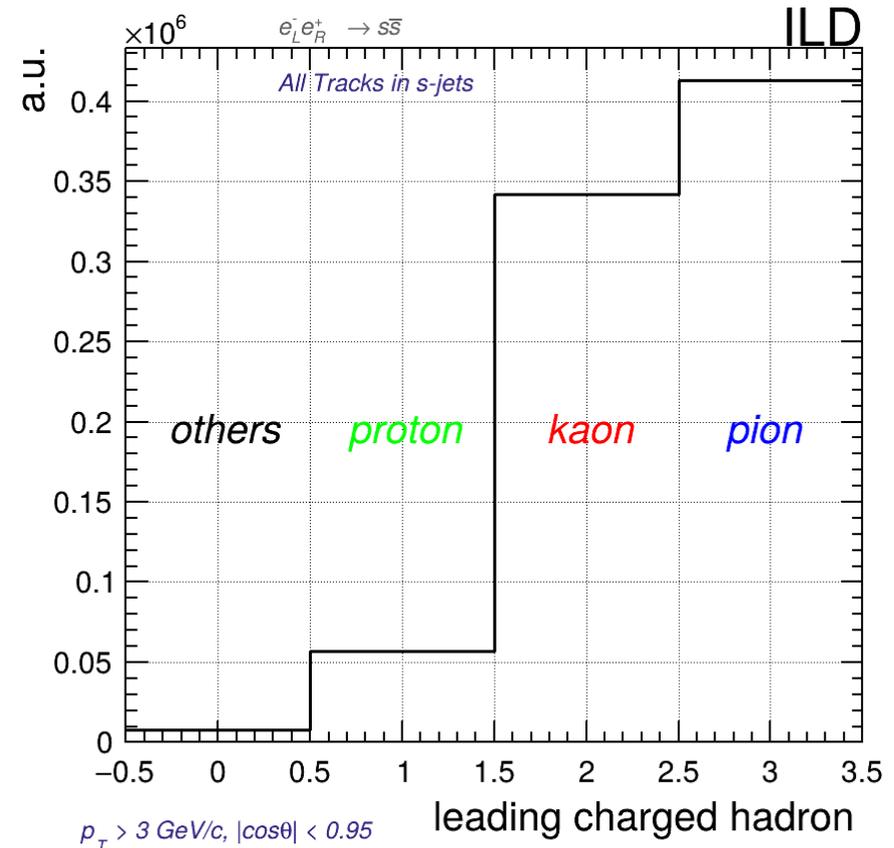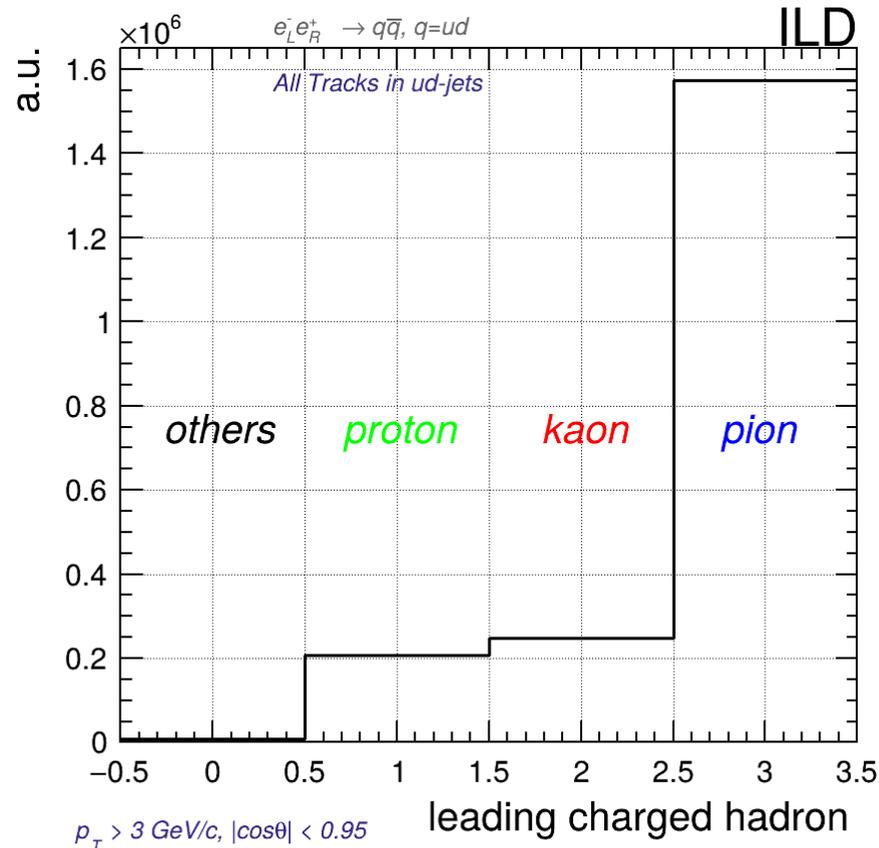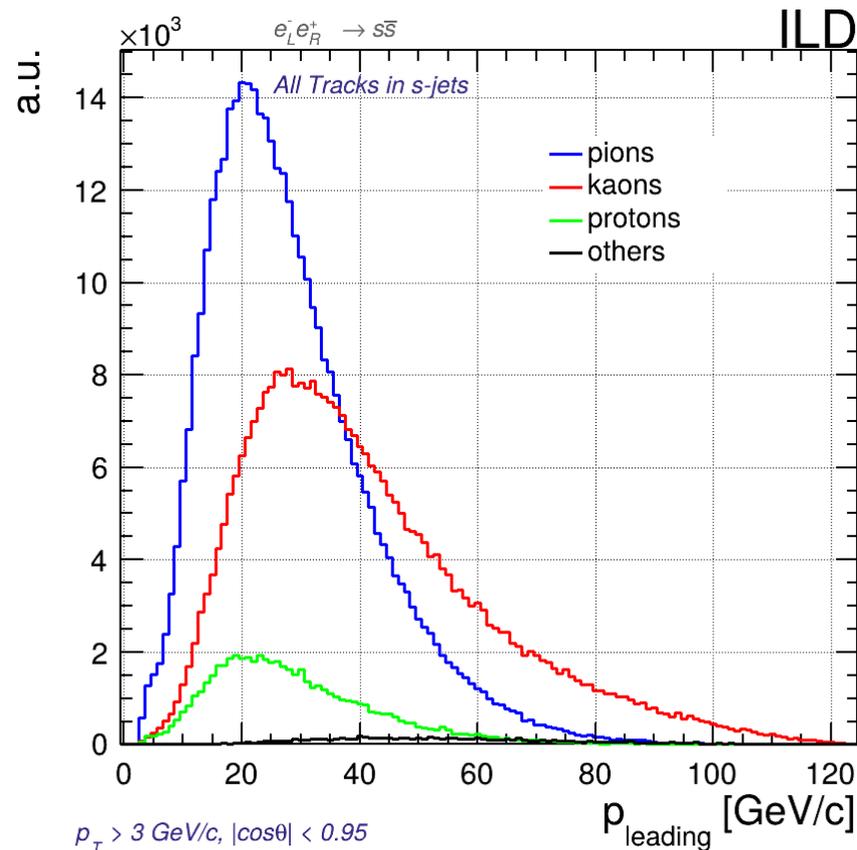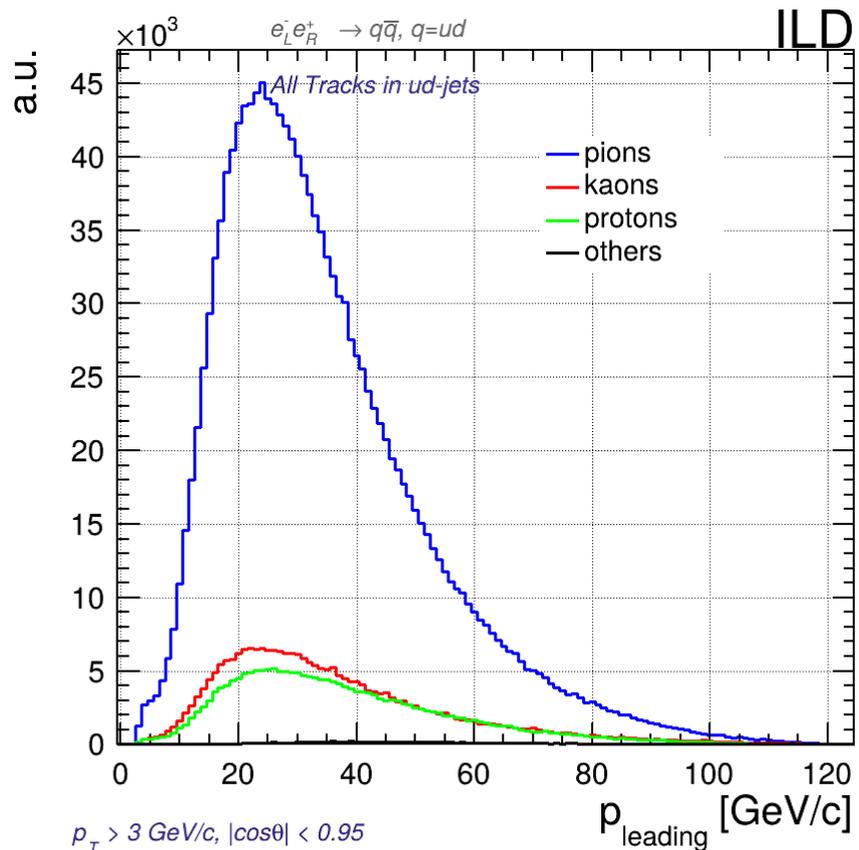
s vs ud: k-dist of leading charged hadrons

- Similar review was done via pi-distance, but shows similar behavior (as expected)

Our target for s-tagging!

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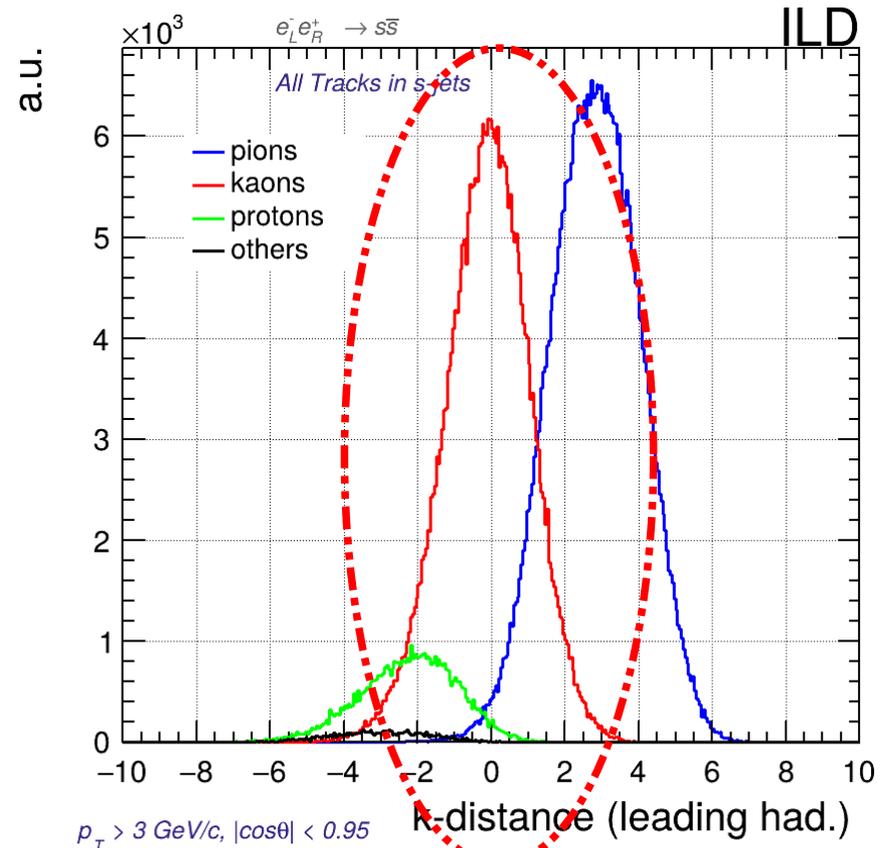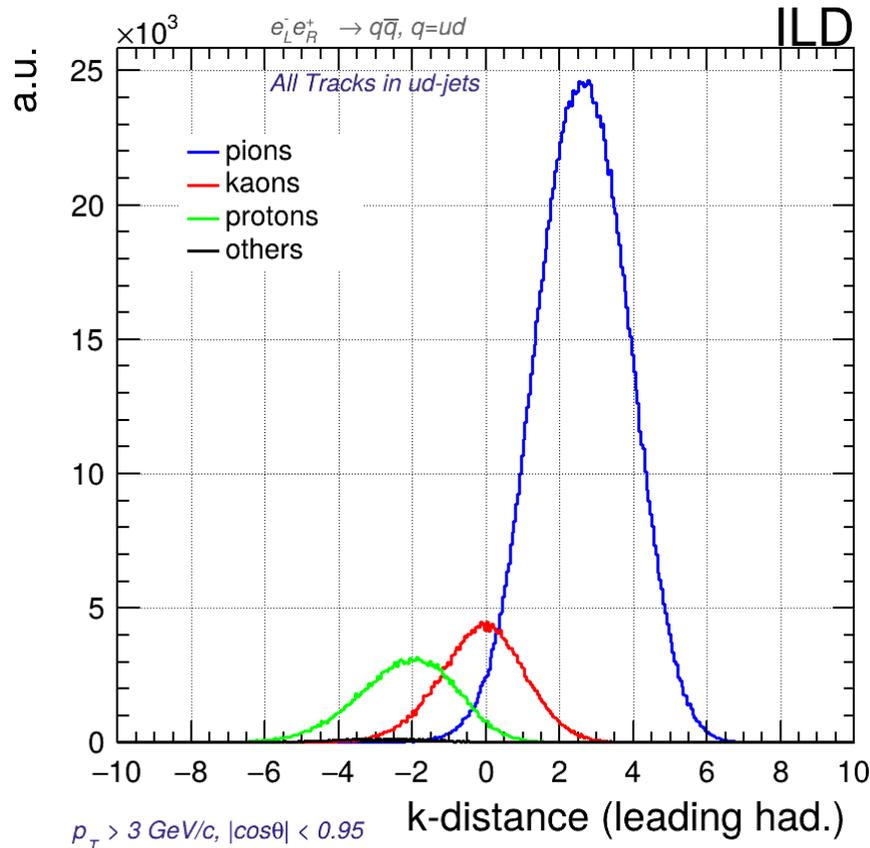
2d view of k-distance (ud quarks)

- Angular cuts are performed in these distributions for selection kaons/pions

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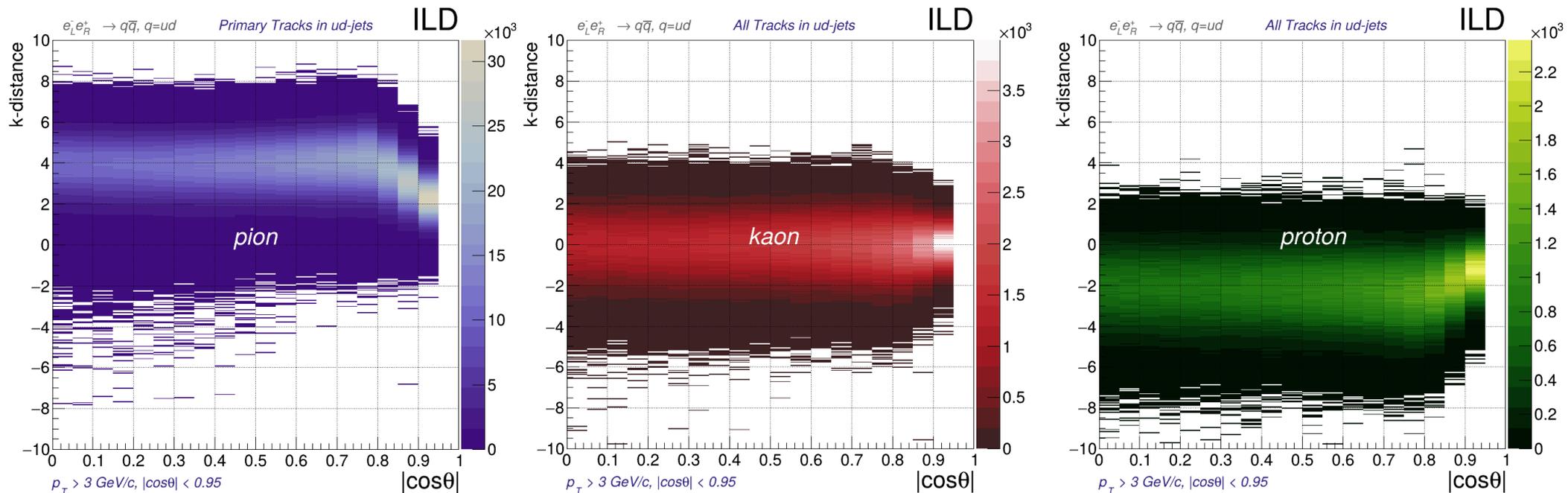
2d view of k-distance (s quarks)

- Angular cuts are performed in these distributions for selection kaons/pions

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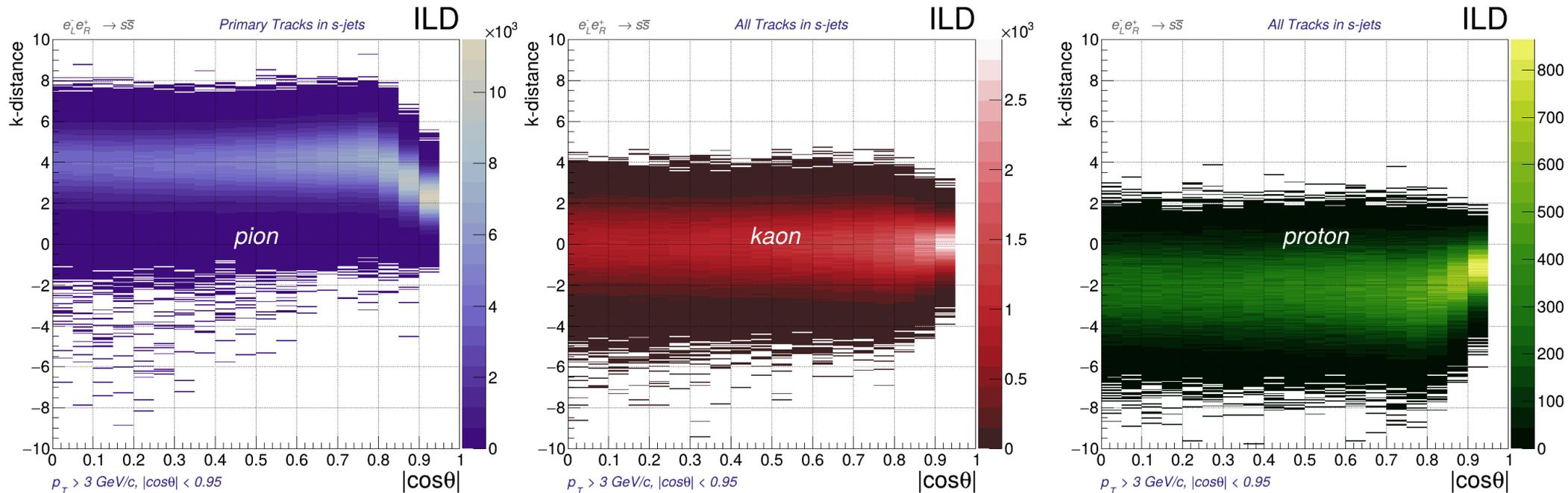
PID prospects (dN/dx & ideal TPC PID)

- We need to revisit the "CheatdEdxProcessor" and the PID info to be used

  ◦ This processor has been fully rebuilt!

- It performs fits to the bins in the 2D k-distance distribution

  ◦ (The ones in the previous slide)

- It rewrites de dEdx info considering an expected improvement in the gaussians σ

  ◦ 30% improvement for a pixel TPC PIC case

  ◦ 99% improvement for an ideal TPC PID case

- Then we can redo the analysis for each case

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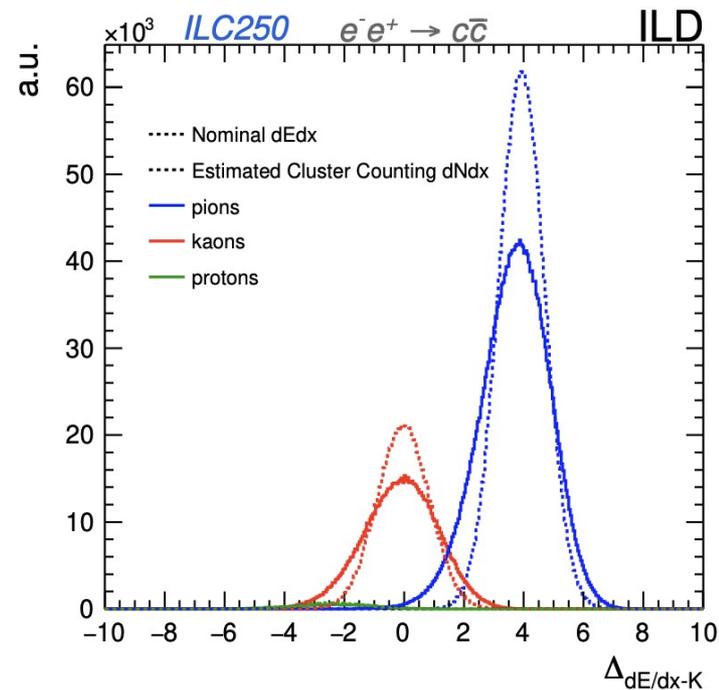
Preliminary results

1. Re-running of the previous analysis **as-it-was**

   ○ Same code, same cuts and working points

   ‣ Same results?

2. Reoptimising the previous analysis with different PID cut

   ○ Using kaon dE/dx distance instead of pure dE/dx info

3. Studying different PID scenarios:

   ○ Cluster counting (dN/dx) in a pixel TPC

   ○ Improvement of a "perfect TPC"

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Preliminary results (π mode for u/d selection)

- Running the previous code as it was

  ◦ Results for $e^-_L e^+_R$

    ‣ (Left) Old analysis vs (right) Relaunch of old analysis

dE/dx

Relaunch

Cuts	Fraction of events after cut (Number of events)				
	$d\bar{d}$	$u\bar{u}$	$s\bar{s}$	$c\bar{c}$	$b\bar{b}$
None	100% (2.01e7)	100% (2.94e7)	100% (1.99e7)	100% (2.94e7)	100% (2.03e7)
Cut 1	94.1%	94.1%	93.2%	69.4%	1.06%
+ Cut 2	91.8%	91.8%	90.9%	12.3%	0.494%
+ Cut 3	89.7%	89.7%	88.8%	11.4%	0.423%
+ Cut 4	51.2%	56.1%	48.4%	4.17%	0.069%
+ Cut 5	46.5%	50.8%	43.9%	3.76%	0.058%
+ Cut 6	44.9%	49.1%	41.7%	3.48%	0.050%
+ Cut 7a	13.7%	13.7%	5.92%	0.438%	0.007%
+ Cut 8	1.75%	2.04%	0.889%	0.102%	0.003%

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 3	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 4	44.9%	51.7%	42.3%	4.02%	0.0755%
+ Cut 5	38.2%	43.9%	35.9%	3.37%	0.0589%
+ Cut 6	36.8%	42.3%	34.1%	3.12%	0.0489%
+ Cut 7	12%	12.7%	7.1%	0.62%	0.0105%
+ Cut 8	1.54%	1.93%	1.1%	0.145%	0.00268%
+ Cut 9	0.891%	1.25%	0.707%	0.0709%	0.000765%

Worse performance (> B/S)

Will use this relaunch as reference

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Preliminary results (K mode for s selection)

- Running the previous code as it was

  ○ Results for $e^-_L e^+_R$

    ‣ (Left) Old analysis vs (right) Relaunch of old analysis

Cuts	Fraction of events after cut (Number of events)				
	$d\bar{d}$	$u\bar{u}$	$s\bar{s}$	$c\bar{c}$	$b\bar{b}$
None	100% (2.01e7)	100% (2.94e7)	100% (1.99e7)	100% (2.94e7)	100% (2.03e7)
Cut 1-6	44.9%	49.1%	41.7%	3.48%	0.050%
+ Cut 7b	1.61%	1.94%	4.91%	0.276%	0.003%
+ Cut 8	0.198%	0.296%	0.625%	0.056%	0.000%

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 3	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 4	44.9%	51.7%	42.3%	4.02%	0.0755%
+ Cut 5	38.2%	43.9%	35.9%	3.37%	0.0589%
+ Cut 6	36.8%	42.3%	34.1%	3.12%	0.0489%
+ Cut 7	2.77%	3.68%	6.1%	0.514%	0.00669%
+ Cut 8	0.393%	0.585%	0.831%	0.111%	0.00306%
+ Cut 9	0.207%	0.391%	0.575%	0.0581%	0.00134%

Worse performance (> B/S)

Will use this relaunch as reference

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Preliminary results (π mode for u/d selection)

- Selecting u/d quarks
  - Results for $e^-_L e^+_R$
    - (Left) Relaunch of old analysis vs (right) New analysis

dE/dx

new

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 3	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 4	44.9%	51.7%	42.3%	4.02%	0.0755%
+ Cut 5	38.2%	43.9%	35.9%	3.37%	0.0589%
+ Cut 6	36.8%	42.3%	34.1%	3.12%	0.0489%
+ Cut 7	12%	12.7%	7.1%	0.62%	0.0105%
+ Cut 8	1.54%	1.93%	1.1%	0.145%	0.00268%
+ Cut 9	0.891%	1.25%	0.707%	0.0709%	0.000765%

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 3	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 4	44.9%	51.7%	42.3%	4.02%	0.0755%
+ Cut 5	38.2%	43.9%	35.9%	3.37%	0.0589%
+ Cut 6	36.8%	42.3%	34.1%	3.12%	0.0489%
+ Cut 7	12.8%	12.9%	5.61%	0.667%	0.0105%
+ Cut 8	1.72%	1.93%	0.86%	0.162%	0.00287%
+ Cut 9	1%	1.22%	0.503%	0.0823%	0.00172%

Better performance… and closer to the previous results!
Was something off in the previous cuts? Or with the code?

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Preliminary results (Κ mode for s selection)

- Selecting s quark

  ○ Results for $e^-_L e^+_R$

    ‣ (Left) Relaunch of old analysis vs (right) New analysis

dE/dx

new

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
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+ Cut 7	2.77%	3.68%	6.1%	0.514%	0.00669%
+ Cut 8	0.393%	0.585%	0.831%	0.111%	0.00306%
+ Cut 9	0.207%	0.391%	0.575%	0.0581%	0.00134%

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 3	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 4	44.9%	51.7%	42.3%	4.02%	0.0755%
+ Cut 5	38.2%	43.9%	35.9%	3.37%	0.0589%
+ Cut 6	36.8%	42.3%	34.1%	3.12%	0.0489%
+ Cut 7	2.37%	2.9%	4.8%	0.218%	0.00191%
+ Cut 8	0.285%	0.464%	0.634%	0.0432%	0.00115%
+ Cut 9	0.163%	0.329%	0.481%	0.0207%	0.000573%

Slightly better performance

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Preliminary results (π mode for u/d selection)

- Selecting u/d quarks
  - Results for $e^-_L e^+_R$
    - (Left) New dE/dx analysis vs (right) Perfect TPC PID

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 3	91.7%	91.6%	90.9%	14.1%	1.37%
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+ Cut 9	0.891%	1.25%	0.707%	0.0709%	0.000765%

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.4%	2.44%
+ Cut 2	91.7%	91.6%	90.9%	14.4%	1.64%
+ Cut 3	91.7%	91.6%	90.9%	14.4%	1.64%
+ Cut 4	45%	52.2%	42.3%	4.44%	0.13%
+ Cut 5	38.2%	44.2%	35.8%	3.69%	0.0914%
+ Cut 6	36.5%	42.3%	33.7%	3.33%	0.0636%
+ Cut 7	17.1%	17.3%	6.66%	0.803%	0.0146%
+ Cut 8	2.16%	2.45%	0.967%	0.181%	0.0043%
+ Cut 9	1.28%	1.57%	0.561%	0.0956%	0.00206%

~25% (u) and ~45% (d) more signal with ~20% less s-quark background

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Perfect TPC PID

- Selecting s quark
  - Results for $e^-_L e^+_R$
    - (Left) New dE/dx analysis vs (right) New analysis

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 3	91.7%	91.6%	90.9%	14.1%	1.37%
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+ Cut 8	0.393%	0.585%	0.831%	0.111%	0.00306%
+ Cut 9	0.207%	0.391%	0.575%	0.0581%	0.00134%

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+ Cut 1	93.9%	93.9%	93.1%	69.4%	2.44%
+ Cut 2	91.7%	91.6%	90.9%	14.4%	1.64%
+ Cut 3	91.7%	91.6%	90.9%	14.4%	1.64%
+ Cut 4	45%	52.2%	42.3%	4.44%	0.13%
+ Cut 5	38.2%	44.2%	35.8%	3.69%	0.0914%
+ Cut 6	36.5%	42.3%	33.7%	3.33%	0.0636%
+ Cut 7	1.23%	1.56%	4.88%	0.203%	0.00168%
+ Cut 8	0.142%	0.258%	0.612%	0.0342%	0.000748%
+ Cut 9	0.0836%	0.184%	0.486%	0.0179%	0.000374%

~15% less signal with ~50% (u) and ~60% (d) less backgrounds

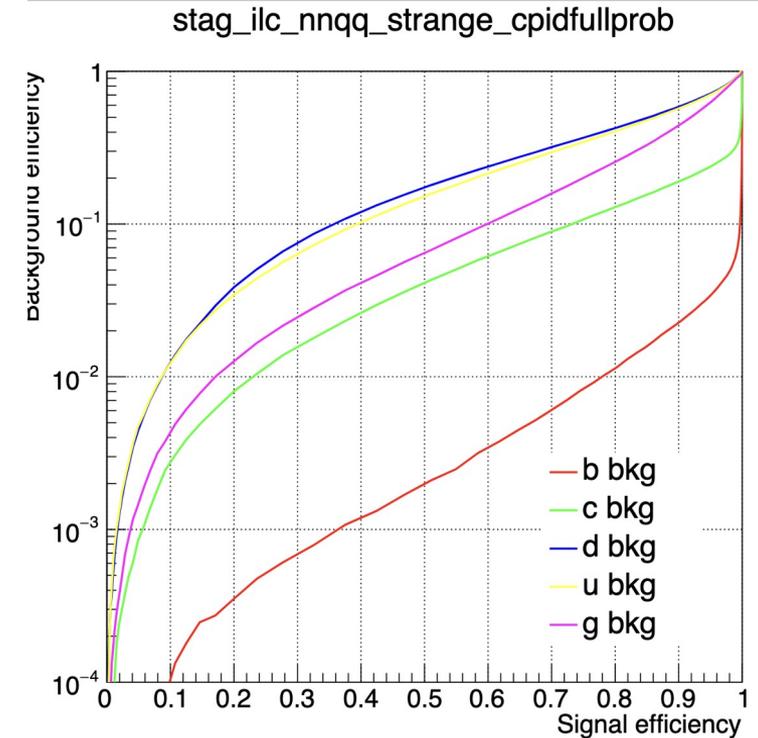Jesús P. Márquez Hernández | CALO5D | IJCLAB

Now running

- From ssbar "Classic analysis":

    - (TBD) Reproducing previous results but with and pixel TPC PID case (cluster counting dN/dx method)

- There's *more* to do still in the "classic" cut-based analysis:

    - Using the comprehensive PID processor (CPID) and redoing dEdx (and dNdx) with it

        ‣ Preparing weights right now for a first test
            – This means: Training a BDT-based ML model

        ‣ Hopefully will run the analysis in a few days

The holy grail: ParT s-tagging

- ParT uses CPID for the tracks PID and Particle Transformer ML for s-tagging

- It can be 10x better than the cut-based approach

  ○ But how? Is this code available? Trying to get access to it to incorporate it into a chain of analysis

  ○ Can reduce the cuts in the analysis into:

    ‣ B-tag

    ‣ C-tag

    ‣ S-tag → Much more powerful than kaon ID

    ‣ Migration cuts:
      – Secondary PFO candidate cut
      – Opposite charge LPFO cut

stag_ilc_nnqq_strange_cpidfullprob

Legend: b bkg, c bkg, d bkg, u bkg, g bkg. Axes: Background efficiency (y), Signal efficiency (x).

1% ss signal with 0.02% u/d backgrounds? 10x improvement!

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Conclusions/overview/discussions

- The previous results were too good an don't seem to be reproducible...
  - Better leave it behind and stick to new results ?
- I still need to finish the dNdx and CPID cases
  - And ParT! (I need to contact T. Suehara to get the software)
- We will comparing:
  - Different reconstruction techniques:
    - Cut-based with plain PID info *vs* ML PID (CPID) info
    - Using advance ML tagging (ParT)
  - Different detector's design:
    - Default TPC (dE/dx) vs Pixel TPD (dN/dx)
- In the future, we want to apply this results for Gauge-Higgs phenomenology
  - We already have a set of models for testing (examples in back-up)

Future plans

- Once we close all the different $s\bar{s}$ and ($u\bar{u}+d\bar{d}$) analysis, I'm moving back to calorimeter stuff

- ECAL simulations:
  - Checking digitisation implementation and cross-checks with TB data (Yukun was into this?)
  - Building SHiP simulations!
    - Different calorimeters combined into a unified tracker-calorimeter system with great PID discrimination for BSM physics
    - SiW-ECAL is a great candidate for this design

- Innovative approach "calorimeter phenomenology":
  - Once we know the physics requirements, best reconstructed variables and best ML PID: We could play around with the detector's design to provided the best performance

132cm of SiW-ECAL!

SHiP

Search for Hidden Particles
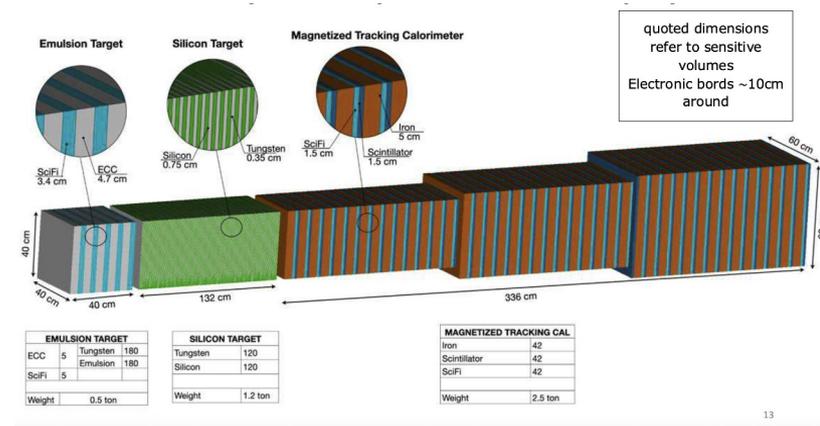
Brainstorming

- I already have some ideas in mind:

  - From previous PID studies I've done (BDT) (https://arxiv.org/pdf/2507.17716)

  - From other DRD6 people (GNN) (Maryna Borysova In DRD6 ANCONA)

- But I will come back to this stuff in the future!

> **I'm open to suggestions in both**
> **ss analyses and**
> **future calorimeter simulation :)**

BACK-UP

Preselection of q$\bar{\text{q}}$ signals

- Once we have the reconstructed pfos of the events with different targets:
  - We cluster the signal in jets (VLC algorithm):
    - The algorithm packs together the PFOs into two jets.
    - Signal is expected in a back-to-back topology (but not the backgrounds!)
      - Most of the background is **radiative return (y q$\bar{\text{q}}$)**
      - And most of the data is background!
        - x3 for $e^-_L e^+_R$ and x6 for $e^-_R e^+_L$ at 250 GeV
        - x4 for $e^-_L e^+_R$ and x7 for $e^-_R e^+_L$ at 500 GeV
  - Then we apply different cuts to the signal to remove the background processes

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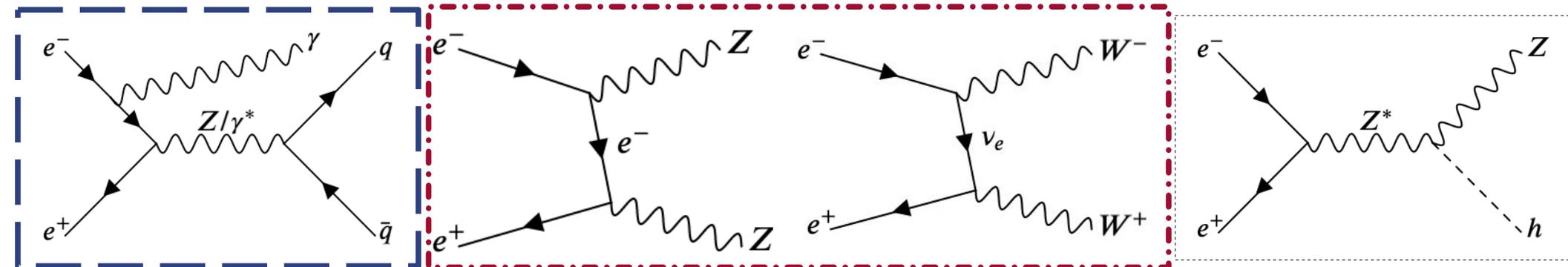
Preselection for 250 GeV

Cuts:
- $K_{reco} < 35$ GeV
- $m_{2jets} > 140$ GeV
- Charged N pfos
- Photon veto
- $Y_{23} < 0.015$

VLC Algorithm parameters:
- R = 1.0
- γ = 0.0
- β = 1.0

| R | Efficiencies (%) | | | | |
	$b\bar{b}$	$c\bar{c}$	$q\bar{q}$ (uds)	ISR	S/B
1.0	64.7	64.6	64.3	0.9	23.7
	68.3	68.5	68.1	1.1	28.1

◄— |cosθ| < 0.9

Total efficiency of the preselection for the different quark flavours and radiative return for the chosen configuration (γ=0). The second row is for |cosθ| < 0.9

$e_L^- e_R^+ \rightarrow q\bar{q}$, q=udscb, 250 GeV, XX fb⁻¹

- —— uū
- —— dd̄
- —— ss̄
- —— bb̄
- ······ cc̄
- —— γZ→ γqq̄ (q=udscb)
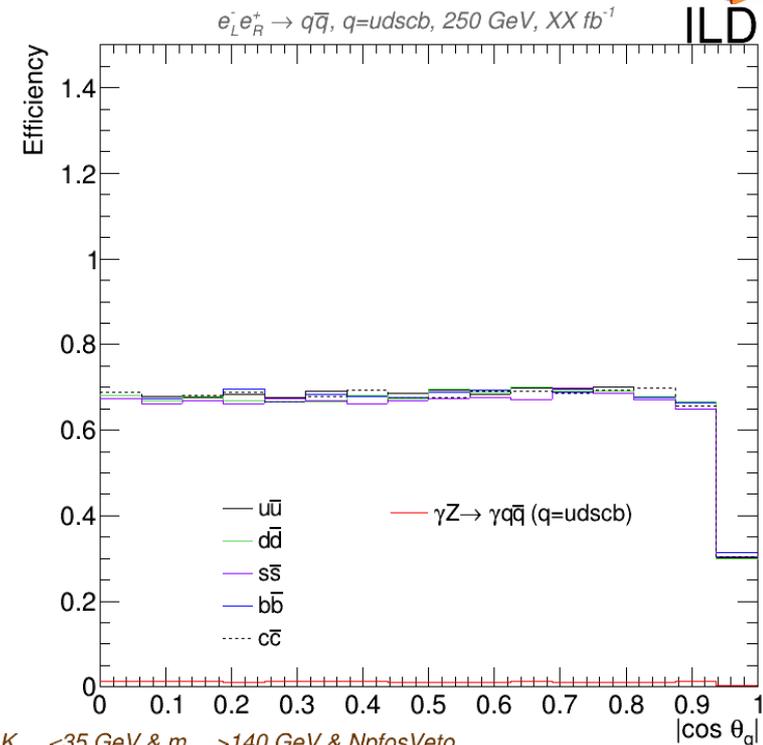
$K_{reco}<35$ GeV & $m_{j_1 j_2}>140$ GeV & NpfosVeto
& Cnpfos Veto & Photon Veto 1 & $y_{23}<0.015$

Efficiency of the preselection for the different quark flavours vs the angular distribution of the two jet system (new samples, final configuration)

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Re-run of previous analysis

- Selecting u & d quarks

Cuts	Fraction of events after cut (Number of events)				
	$d\bar{d}$	$u\bar{u}$	$s\bar{s}$	$c\bar{c}$	$b\bar{b}$
None	100% (2.01e7)	100% (2.94e7)	100% (1.99e7)	100% (2.94e7)	100% (2.03e7)
Cut 1	94.1%	94.1%	93.2%	69.4%	1.06%
+ Cut 2	91.8%	91.8%	90.9%	12.3%	0.494%
+ Cut 3	89.7%	89.7%	88.8%	11.4%	0.423%
+ Cut 4	51.2%	56.1%	48.4%	4.17%	0.069%
+ Cut 5	46.5%	50.8%	43.9%	3.76%	0.058%
+ Cut 6	44.9%	49.1%	41.7%	3.48%	0.050%
+ Cut 7a	13.7%	13.7%	5.92%	0.438%	0.007%
+ Cut 8	1.75%	2.04%	0.889%	0.102%	0.003%

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 3	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 4	44.9%	51.7%	42.3%	4.02%	0.0755%
+ Cut 5	38.2%	43.9%	35.9%	3.37%	0.0589%
+ Cut 6	36.8%	42.3%	34.1%	3.12%	0.0489%
+ Cut 7	12%	12.7%	7.1%	0.62%	0.0105%
+ Cut 8	1.54%	1.93%	1.1%	0.145%	0.00268%
+ Cut 9	0.891%	1.25%	0.707%	0.0709%	0.000765%

K mode for eLpR

- Selecting s quarks

Cuts	Fraction of events after cut (Number of events)				
	$d\bar{d}$	$u\bar{u}$	$s\bar{s}$	$c\bar{c}$	$b\bar{b}$
None	100% (2.01e7)	100% (2.94e7)	100% (1.99e7)	100% (2.94e7)	100% (2.03e7)
Cut 1-6	44.9%	49.1%	41.7%	3.48%	0.050%
+ Cut 7b	1.61%	1.94%	4.91%	0.276%	0.003%
+ Cut 8	0.198%	0.296%	0.625%	0.056%	0.000%

	dd	uu	ss	cc	bb
+ Cut 1	93.9%	93.9%	93.1%	69.3%	2.12%
+ Cut 2	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 3	91.7%	91.6%	90.9%	14.1%	1.37%
+ Cut 4	44.9%	51.7%	42.3%	4.02%	0.0755%
+ Cut 5	38.2%	43.9%	35.9%	3.37%	0.0589%
+ Cut 6	36.8%	42.3%	34.1%	3.12%	0.0489%
+ Cut 7	2.77%	3.68%	6.1%	0.514%	0.00669%
+ Cut 8	0.393%	0.585%	0.831%	0.111%	0.00306%
+ Cut 9	0.207%	0.391%	0.575%	0.0581%	0.00134%

K selection may need some tweak, but the overall results are comparable

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Pi mode for eRpL

Cuts	Fraction of events after cut (Number of events)				
	$d\bar{d}$	$u\bar{u}$	$s\bar{s}$	$c\bar{c}$	$b\bar{b}$
None	100% (4.43e6)	100% (1.25e7)	100% (4.39e6)	100% (1.25e7)	100% (4.47e6)
Cut 1	94%	94.1%	93.3%	69.4%	1.06%
+ Cut 2	91.8%	91.8%	90.9%	12.3%	0.497%
+ Cut 3	89.7%	89.7%	88.8%	11.4%	0.427%
+ Cut 4	51.2%	56.2%	48.4%	4.17%	0.070%
+ Cut 5	46.4%	50.9%	43.9%	3.76%	0.060%
+ Cut 6	44.8%	49.1%	41.7%	3.48%	0.051%
+ Cut 7a	13.7%	13.7%	5.95%	0.440%	0.007%
+ Cut 8	1.75%	2.05%	0.896%	0.102%	0.003%

	dd	uu	ss	cc	bb
+ Cut 1	94%	93.9%	93.2%	69.4%	3.38%
+ Cut 2	92%	91.6%	91.1%	14.7%	2.44%
+ Cut 3	92%	91.6%	91.1%	14.7%	2.44%
+ Cut 4	38.1%	50.4%	35.9%	3.93%	0.0682%
+ Cut 5	32.3%	42.7%	30.4%	3.3%	0.0515%
+ Cut 6	31.2%	41.3%	28.9%	3.04%	0.0457%
+ Cut 7	10.2%	12.4%	6.11%	0.616%	0.0105%
+ Cut 8	1.28%	1.86%	0.948%	0.147%	0.0029%
+ Cut 9	0.752%	1.2%	0.606%	0.0764%	0.00218%

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Cuts	Fraction of events after cut (Number of events)				
	$d\bar{d}$	$u\bar{u}$	$s\bar{s}$	$c\bar{c}$	$b\bar{b}$
None	100% (4.43e6)	100% (1.25e7)	100% (4.39e6)	100% (1.25e7)	100% (4.47e6)
Cut 1-6	44.8%	49.1%	41.7%	3.48%	0.051%
+ Cut 7b	1.59%	1.93%	4.89%	0.275%	0.003%
+ Cut 8	0.192%	0.293%	0.635%	0.055%	0.001%

	dd	uu	ss	cc	bb
+ Cut 1	94%	93.9%	93.2%	69.4%	3.38%
+ Cut 2	92%	91.6%	91.1%	14.7%	2.44%
+ Cut 3	92%	91.6%	91.1%	14.7%	2.44%
+ Cut 4	38.1%	50.4%	35.9%	3.93%	0.0682%
+ Cut 5	32.3%	42.7%	30.4%	3.3%	0.0515%
+ Cut 6	31.2%	41.3%	28.9%	3.04%	0.0457%
+ Cut 7	2.3%	3.6%	5.04%	0.493%	0.00327%
+ Cut 8	0.344%	0.571%	0.655%	0.11%	0.00109%
+ Cut 9	0.182%	0.381%	0.449%	0.054%	0.000363%

K selection may need some tweak, but the overall results are comparable

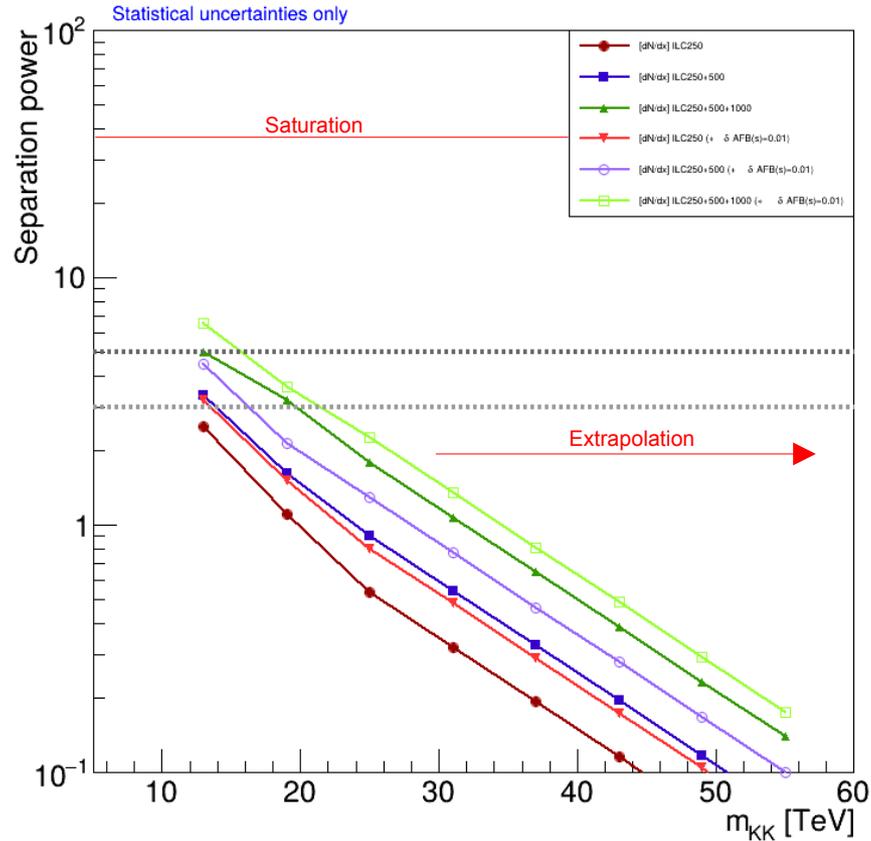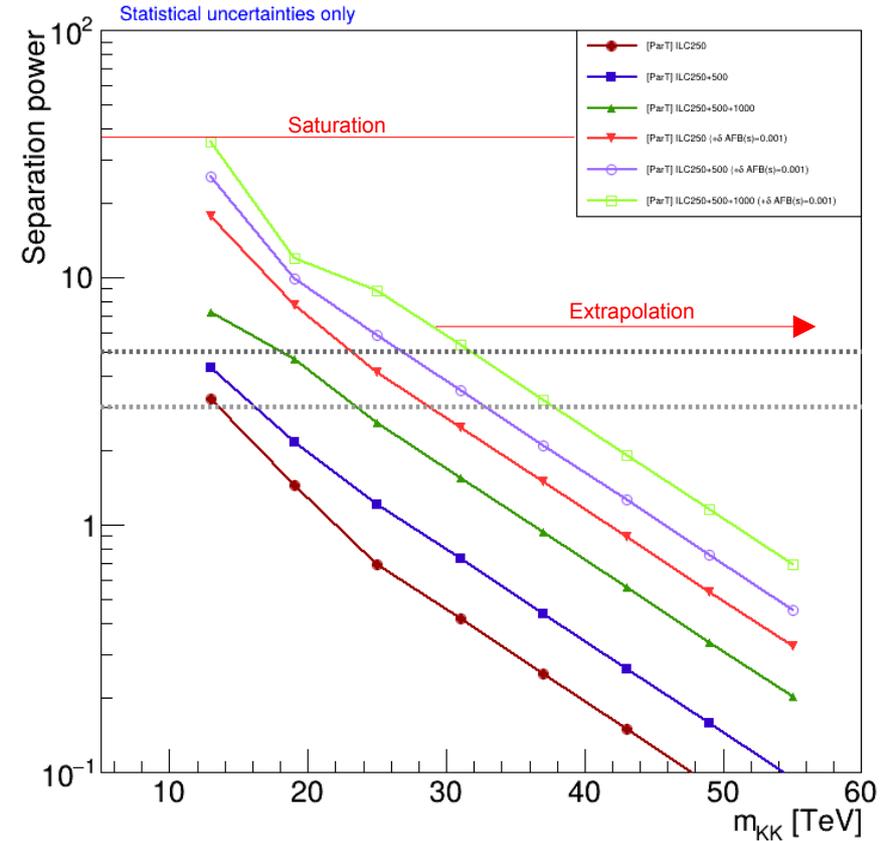Jesús P. Márquez Hernández | CALO5D | IJCLAB

GHU phenomenology

B+ models mass scale

- Worst (dN/dx + 1% δA_{FB} for s-quark) vs best (ParT + 1‰ δA_{FB} for s-quark) prospects
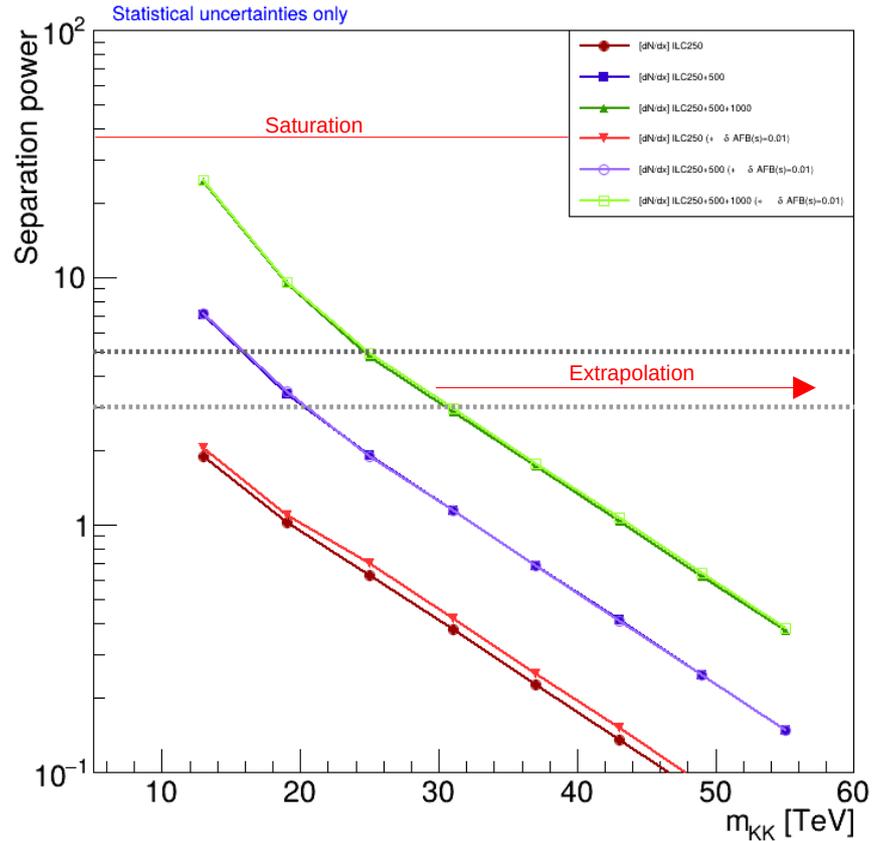

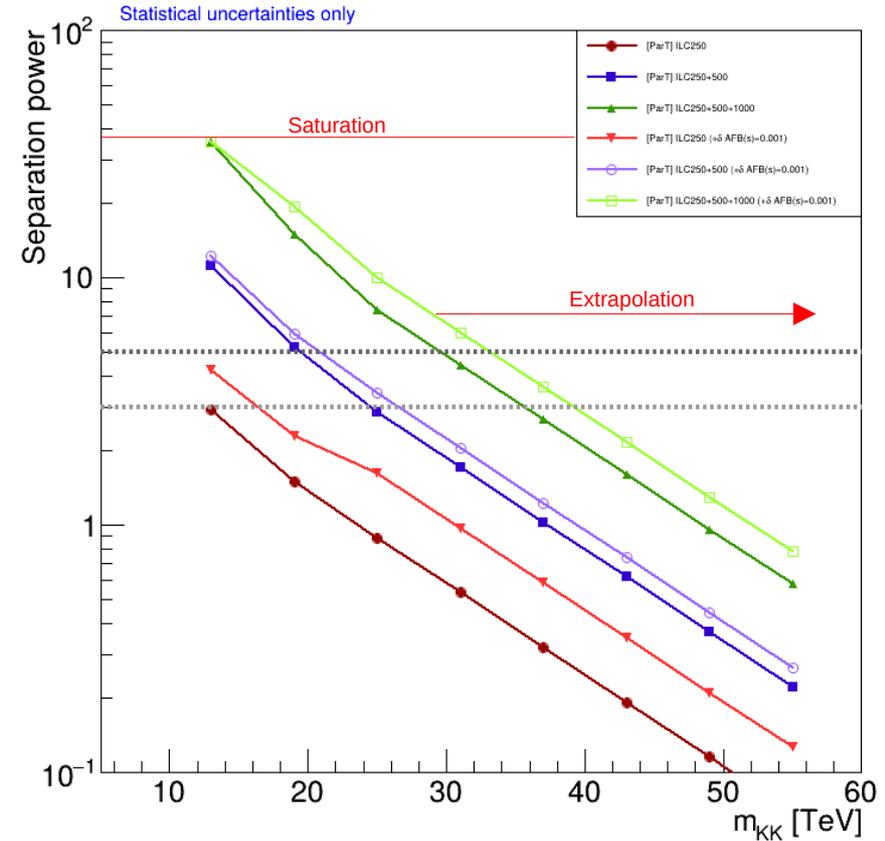
B+ Models (b & c quarks)

B+ Models (b & c quarks)

B- models mass scale

- Worst (dN/dx + 1% δA_{FB} for s-quark) vs best (ParT + 1‰ δA_{FB} for s-quark) prospects

B- Models (b & c quarks)

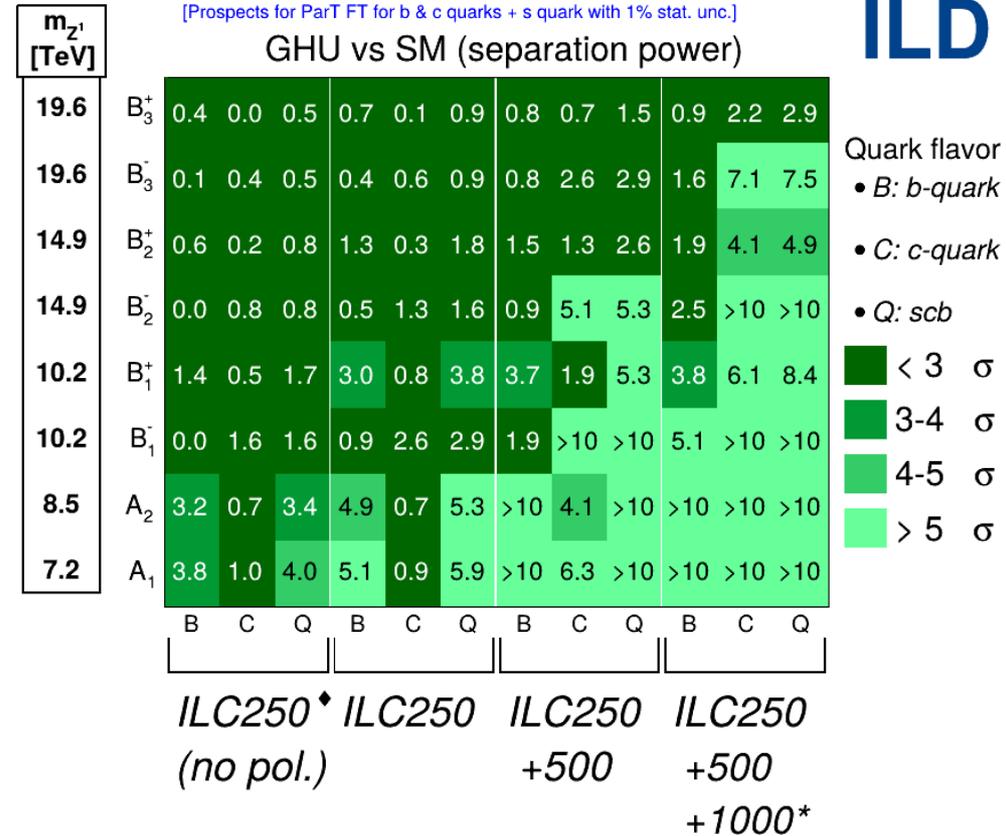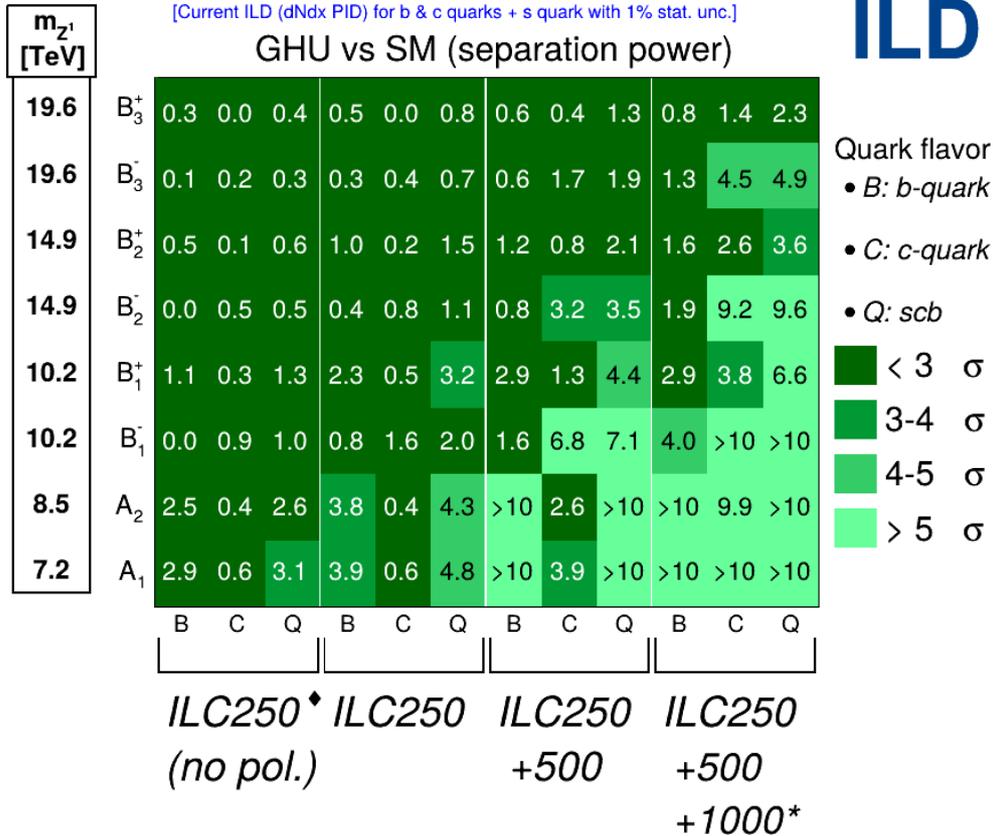B- Models (b & c quarks)

Adding s quark (1% relative error)

- ILC with pixel TPC (dN/dx for PID) || ILC with prospects using ParT flavour tagging

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Adding s quark (1‰ relative error)

- ILC with pixel TPC (dN/dx for PID) || ILC with prospects using ParT flavour tagging

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