Status report on studies of PID accuracy

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Motivation

- Detectors specialised for momentum ranges and particles
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Solutions:

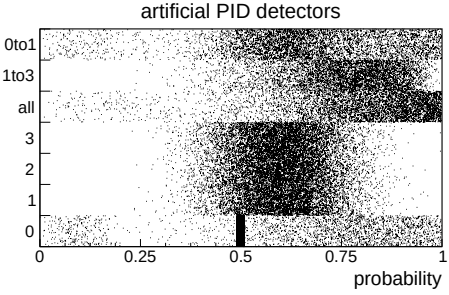
- Combine algorithms to improve PID
- Understand optimal ranges for PID algorithms

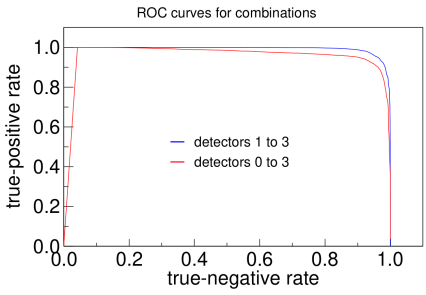
Impact of wrong PID - Example

- 4 artificial 'detectors'
- combined using bayesian approach

Detector 0:

- On average: better than *a priori* probability (0.5)
- But: will worsen overall performance, when combined





PID algorithms

Direction	Detector
forward	PidAlgoDisc
	PidAlgoFtof
	PidAlgoRich
	PidAlgoMdtHardCuts
both	PidAlgoEmcBayes
barrel	PidAlgoMvd
	PidAlgoDrc
	PidAlgoStt
	PidAlgoSciT

we can ask for PID probabilities:

```
PndAnalysis->FillList(plist,[...],detector)
plist[i]->GetPidInfo(particle)
```

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- 9 detectors in total
- $2^9 - 1 = 511$ possible combinations
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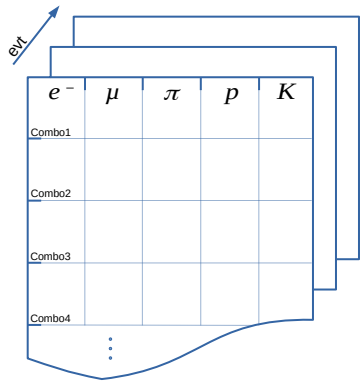
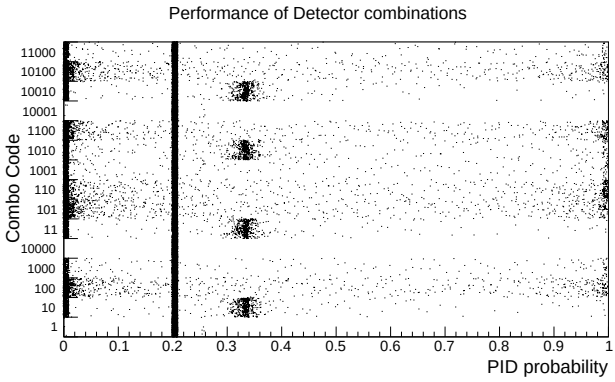
- Consider forward and barrel directions separately
- Reduced to 32 combinations



First data

Simulation: e^-, $\theta \in [0°, 20°]$, $p = 2GeV$



binary labels on y-Axis indicate selected algorithms:

bit #5	bit #4	bit #3	bit #2	bit #1
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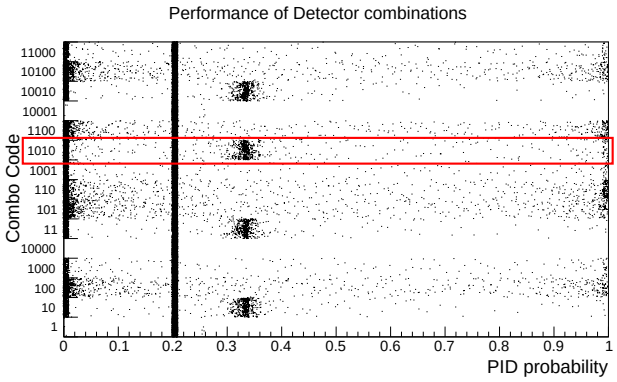

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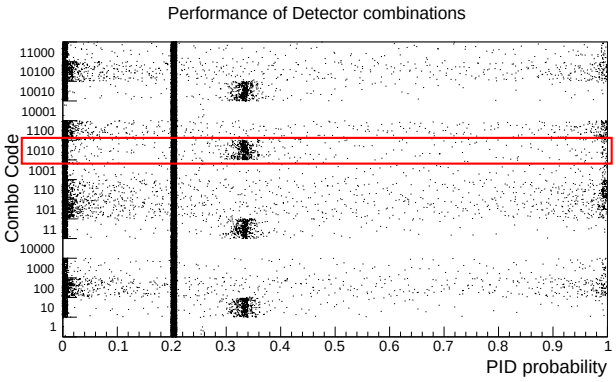

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- $\approx$ 50% of entries are 0.2
- RICH and MDT show only 0.2

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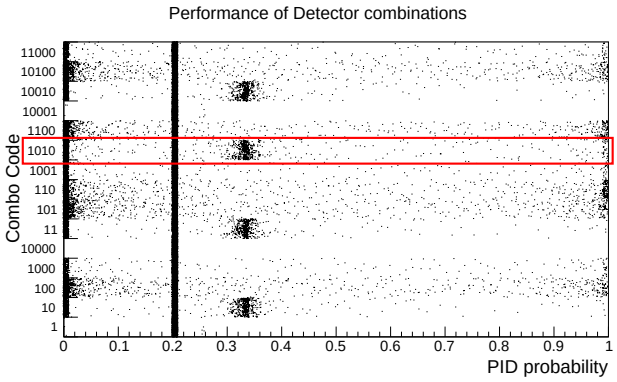

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- RICH and MDT show only 0.2
- Most definitely a computing error

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- Characterization for e, μ, π, K, p

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Outlook:

- More data
- Sampling of full momentum range
- Characterization for e, μ, π, K, p
- ROC curves for detector combinations