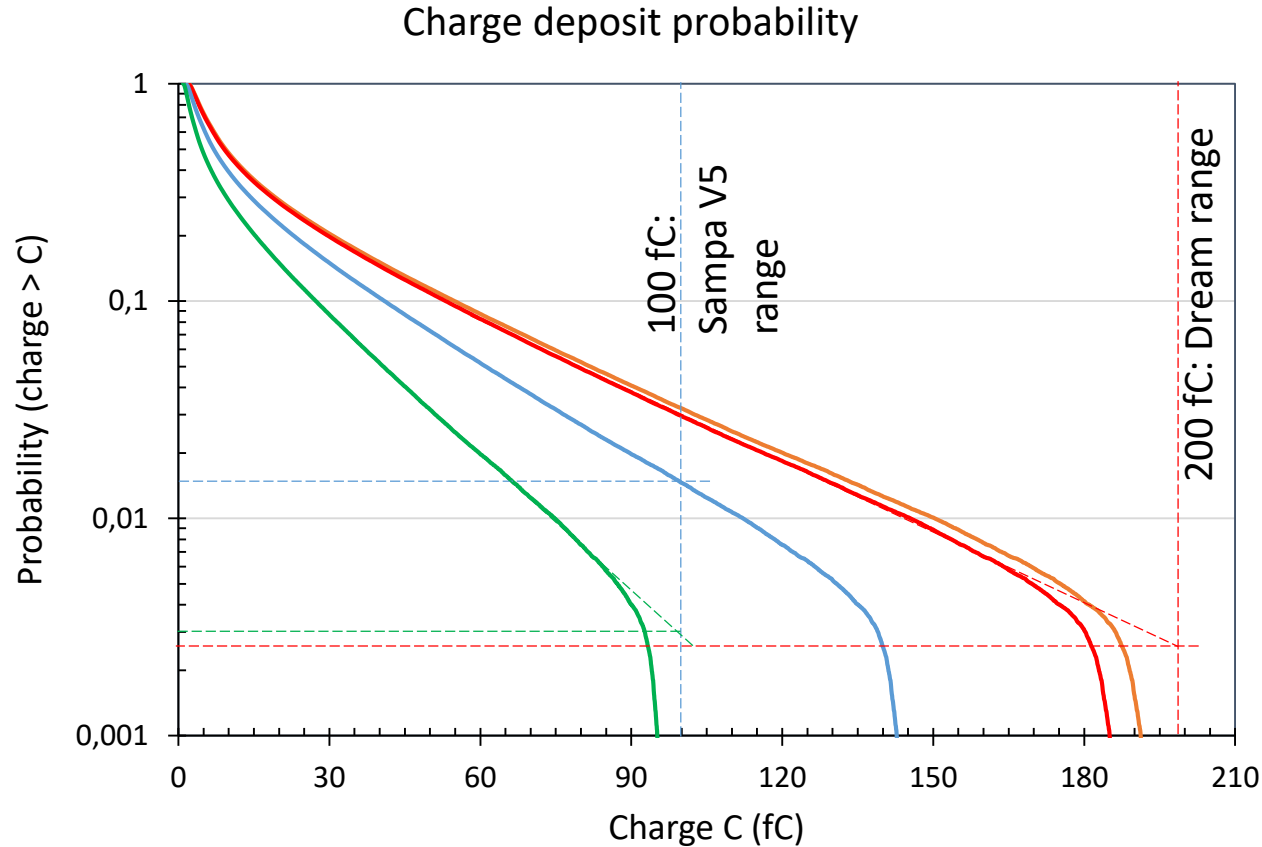


# Dynamic range



- Max charge on Dream CSA input
  - Charge on the strip deduced
  - Charge on Sampa CSA input
  - Charge on Sampa CSA input with 1.5 division of signal
- (Sampa prob  $C > 100$  fC = Dream prob  $C > 200$  fC)

Dream: probability to exceed 200 fC range < 0.3%

Sampa: probability to exceed 100 fC range ~1.4% - probably tolerable

Signal division by 1.5 to have overflow probability equivalent to Dream

Either a passive divider or detector gain reduction

Recommendation: avoid passive divider

Dream CSA:  $C_F = 2$  pF  $A = 3\,000$

Sampa CSA:  $C_F = 1.6$  pF  $A = 368$

$C_{DET} = 120$  pF

$C_{CAB} = 80$  pF

$$C_{csa} = \frac{C_F * A}{C_F * A + C_{DET} + C_{CAB}} * C_{strip}$$

# Noise

“Raw” noise  $\sim 3$  fC of a coherent origin  
For some tiles can be even more

Assuming no treatment and  $5\sigma$  ZS threshold  
Dream: 15 fC min signal  
Sampa: 20 fC min signal  
Sampa with signal division by 1.5: 30 fC min signal

Noise after coherent noise subtraction:  $\sim 0.5$  fC  $\rightarrow$  ENC=3 125e  
Expected for Dream and 200 pF input capacitance  
Coherent noise subtraction done online in FEU FPGA before ZS  
To be implemented in new electronics  
Sampa ENC for 200 pF input capacitance to be checked

Assuming same noise performance for Dream and Sampa with 200 fC input  
Assuming  $5\sigma$  ZS threshold  
Dream: 2.5 fC min signal  
Sampa: 3.35 fC min signal - acceptable  
Sampa with signal division by 1.5: 5 fC min signal

Recommendation: coherent noise subtraction before ZS

# Timing

Dream/FEU sampling rate and shaping times are programmable

Typical working point is 40 MSPS with 180 ns peaking time

- 40 ns sampling period from Dream

- 8 ns fine time stamp from FEU

- 4 ns fine time stamp from backend (SSP)

Data within the event can be tagged with 4 ns resolution

Used for association with trigger and signal maximum fit

Sampa V5: 20 MSPS with 160 ns peaking time

- Close to the current working point

- 160 ns should not create excessive ballistic deficit

- Noise should not increase excessively too

- But performance with high capacitive input to be checked

Recommendation: Do at least as good for data time tagging