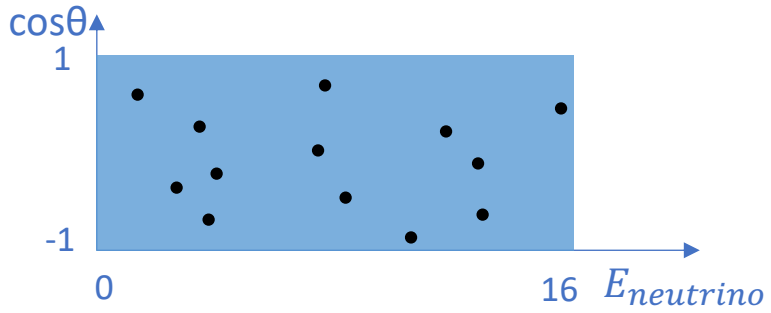
Signal generation

Generate nuclear recoil

Uniform random sampling:
a) $E_{neutrino}$ [0, 16MeV]
b) cosθ [-1, 1]



①

1. $E_{Xe\ recoil}$
2. $\frac{d\Phi}{dEn} \times \frac{d\sigma}{dcos\theta}$: # of events/s/ton/MeV/cosθ

$\frac{d\Phi}{dEn}$ = # of ^{8}B neutrinos/s/cm^2/MeV
$\frac{d\sigma}{dcos\theta}$ = differential cross section/ton

②

Generate Signal

GetYields
electron
photon
exciton ratio
Linhard factor

Gaussian ③

GetQuanta
electron
photon

④

GetS1

Nph —binom(Nph, g1)→ nHits —nHits+binom(nHits, P_dphe)→ Nphe

⑤

GetS2

Ne —binom(Ne, exp(-t/elife) * EEE)→ Nee —gaus(SEG*Nee, SEG*Nee*Fano)→

nHits —nHits+binom(nHits, P_dphe)→ Nphe

Notes
1. ②③④⑤ based on NEST model
2. abbrev
P_dphe: prob that one hit generate 2 PE
g1: photon detected/s1 scintillation
EEE: electron extraction efficiency
SEG: single electron gain, photon detected/s2 electron