Group Meeting

Jeonghyeok Park

G4QMD model bug

Koi, T. & Asai, Makoto & Wright, D & Niita, Koji & Nara, Yasushi & Amako, K & Sasaki, T. (2003). Interfacing the JQMD and JAM Nuclear Reaction Codes to Geant4. 10.2172/813352.

```
for ( int i = 0 ; i < a ; i++ )
{

   G4ParticleDefinition* pd;

   if ( i < z )
   {
      pd = G4Proton::Proton();
   }
   else
   {
      pd = G4Neutron::Neutron();
   }
   G4ThreeVector p( 0.0 );
   G4ThreeVector r( 0.0 );
   G4QMDParticipant* aParticipant = new G4QMDParticipant( pd , p , r );
   SetParticipant( aParticipant );

}

G4double radious = r00 * G4Pow::GetInstance()->A13( double ( GetMassNumber() ) );

rt00 = radious - r01;
radm = radious - rada * ( gamm - 1.0 ) + radb;
rmax = 1.0 / ( 1.0 + G4Exp ( -rt00/saa ) );

//maxTrial = 1000;

//Nucleon primary or target case;
if ( z == 1 && a == 1 ) {  // Hydrogen  Case or proton primary
   SetParticipant( new G4QMDParticipant( G4Proton::Proton() , G4ThreeVector( 0.0 ) , G4ThreeVector( 0.0 ) ) );
   ebini = 0.0;
   return;
}
```

Bug report

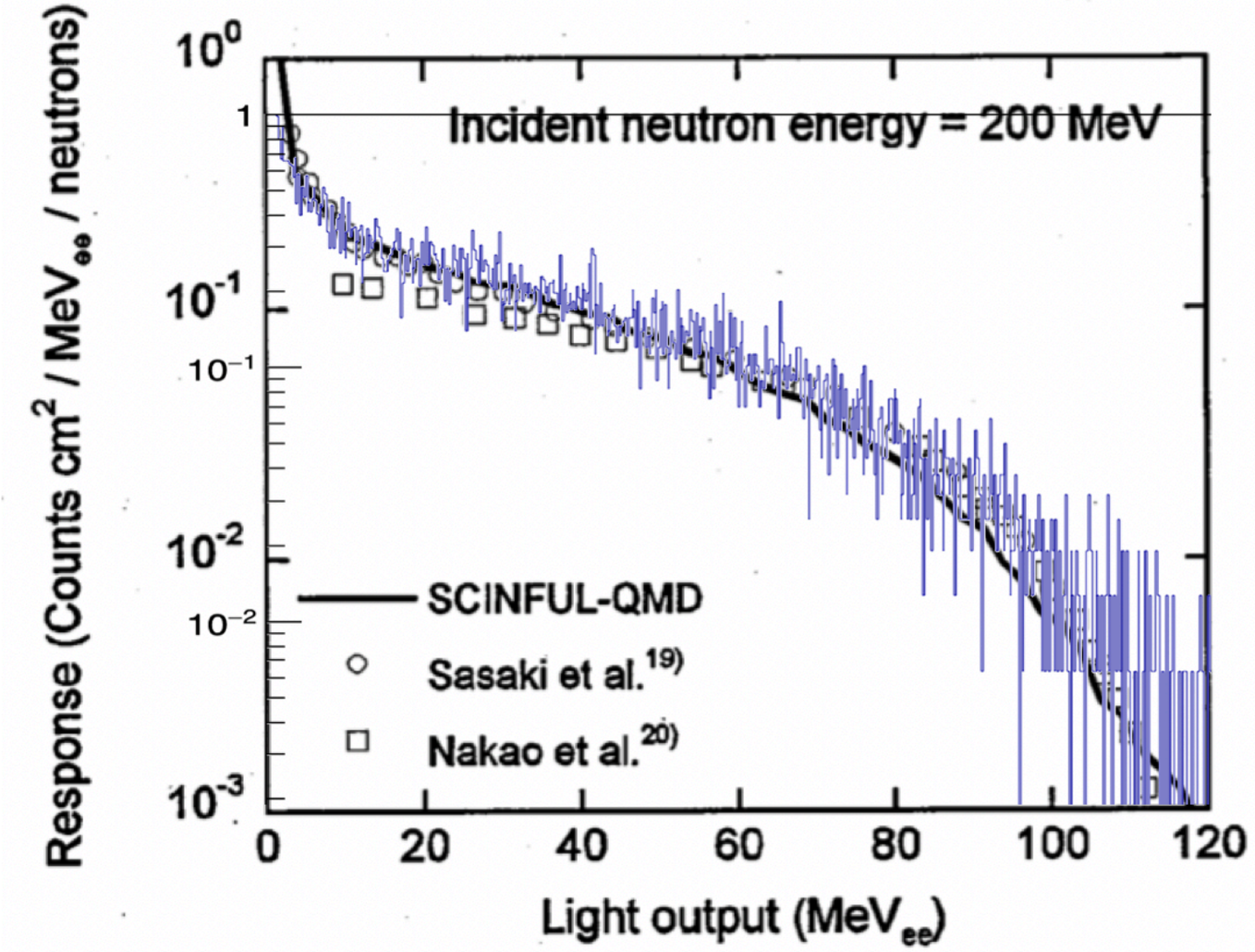
ID	Product	Comp▲	Assignee	Status	Resolution	Summary	Changed
2229	Document	Applicat	alexander.howard@cern.ch	NEW	---	G4CASCADE_CHECK_PHOTONUCLEAR not documented	2020-02-13
2232	Environm	g4py	Koichi.Murakami@kek.jp	NEW	---	g4py compilation: error: no matching function for call to G4UnitsTable::G4UnitsTable	2020-04-07
2235	Examples	medical/	incerti@cenbg.in2p3.fr	NEW	---	G4Track returns incorrect coordinates and step lengths of chemical species	2020-04-07
2230	Geant4	processe	Vladimir.Ivantchenko@cern.ch	NEW	---	Visual Studio Debug multithreaded build crashes in G4LossTableBuilder constructor	2020-02-19
2236	Geant4	processe	tkoi@slac.stanford.edu	NEW	---	Cannot use G4QMD model for proton, neutron and pions.	Wed 11:18
2231	Geant4	visualiz	laurent.garnier@univ-rennes...	NEW	---	G4cout from workers is not captured by the Qt GUI	2020-02-28

Add participant (neutron)

Add participant once more?

G4QMD vs SCINFUL-QMD

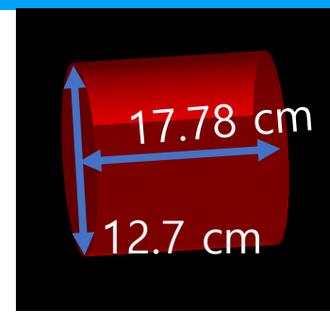
200 MeV



QMD+SCINFUL

Light response G4 vs SCINFUL-QMD
Used G4QMD model in GEANT4

G4QMD vs SCINFUL-QMD

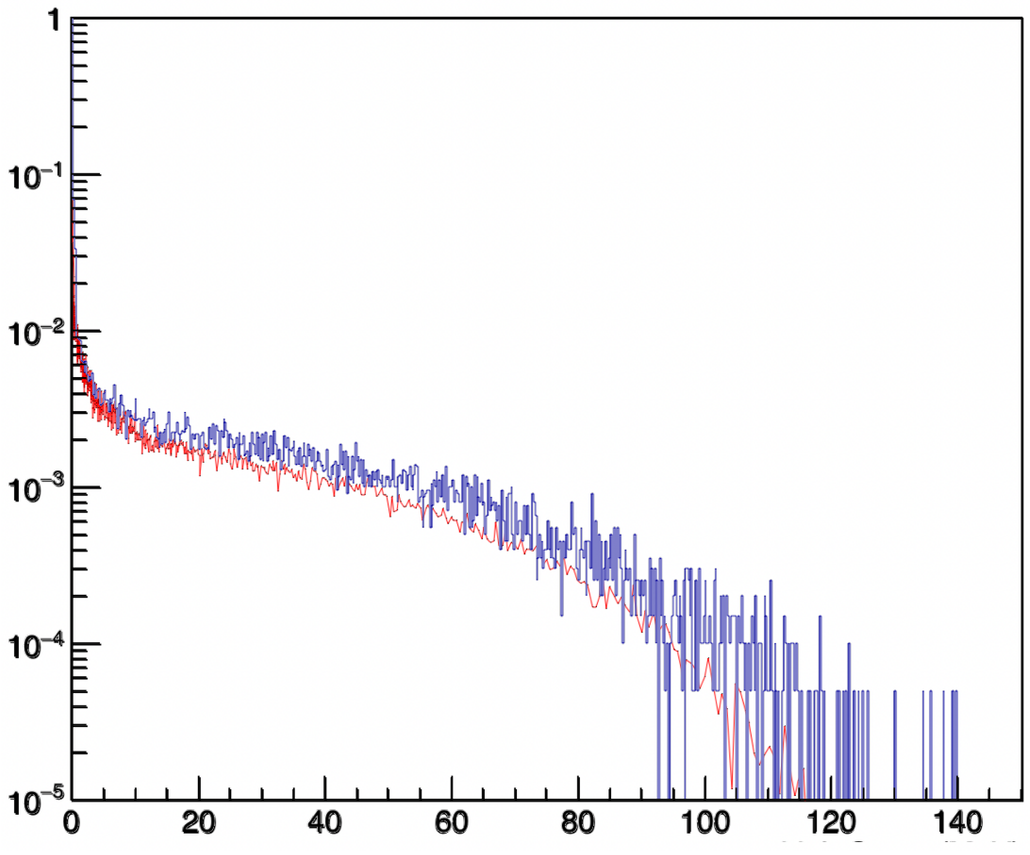


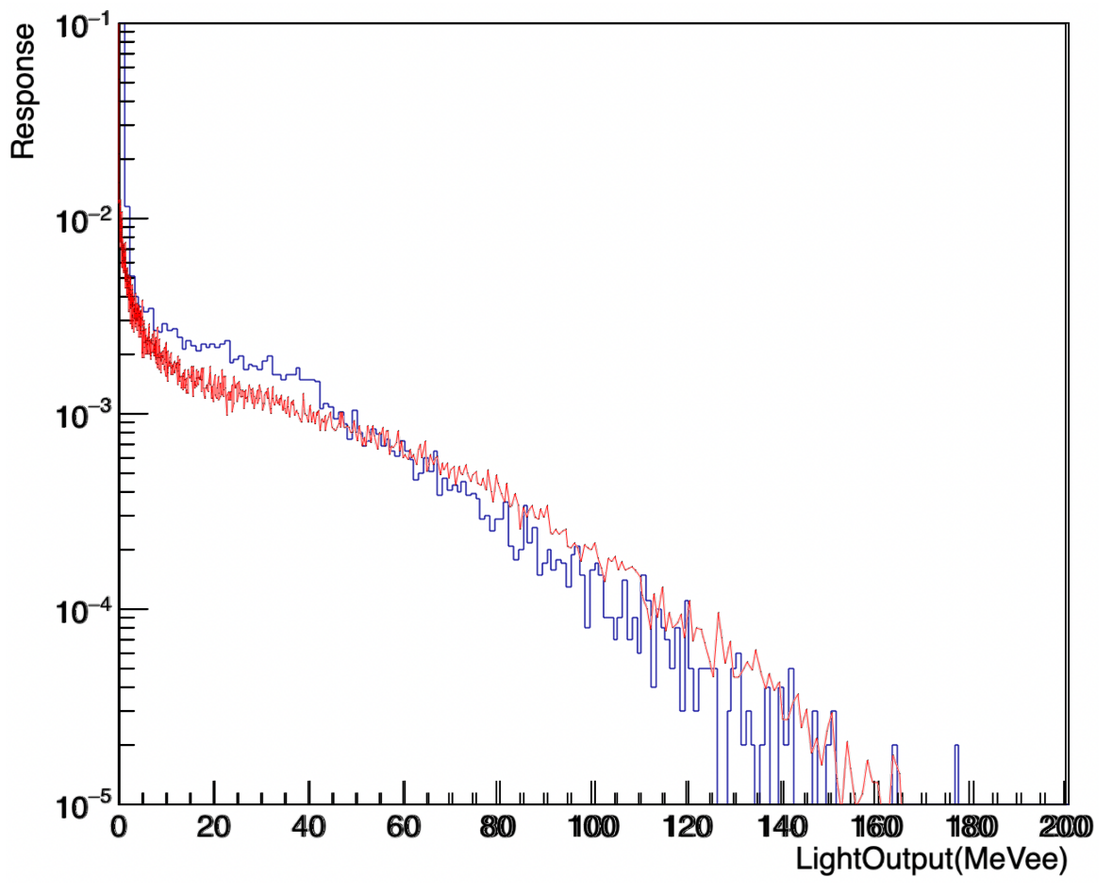
200 MeV

350 MeV

SCINFUL-QMD result

GEANT result





QMD+SCINFUL

Lower statistics(x 1e-1) because of calculation time

Plans

1. Experimental light responses for neutron energy above 60 MeV exhibit a discrepancy at low light output region: Experiment always have high yield than SCINFUL-QMD & Park-Geant4. Seems like a problem on the experimental side.

2. Look at experimental light response functions below 20 MeV to check what is the cause of the peak.

3. Park: Plot yield ratio and efficiency ratio between SCINFUL-QMD and Park-Geant4. Right now, it seems that Park-Geant4 overestimates the efficiency when compared to SCINFUL-QMD.

4. Fanurs: Change SCINFUL geometry to check 2D plot discontinuity (see previous slide). Park: Can similar 2D plot be generated?

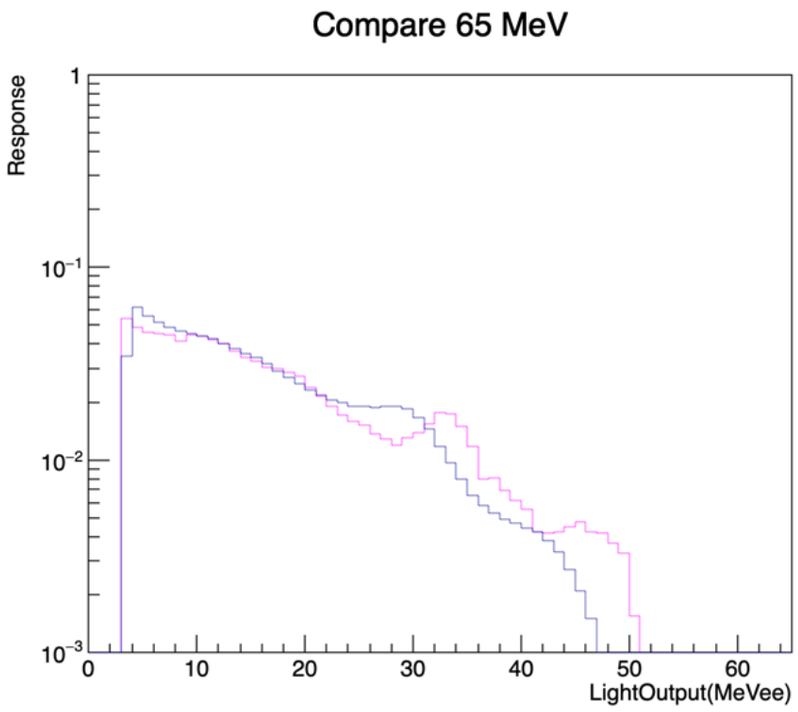
6. Create Google Drive to share data. Then, Park can further match the "attenuation length" in his simulation. Experimentally (using geometric mean), we measured that to be 90 cm. On SCINFUL-QMD, we use 25 cm.

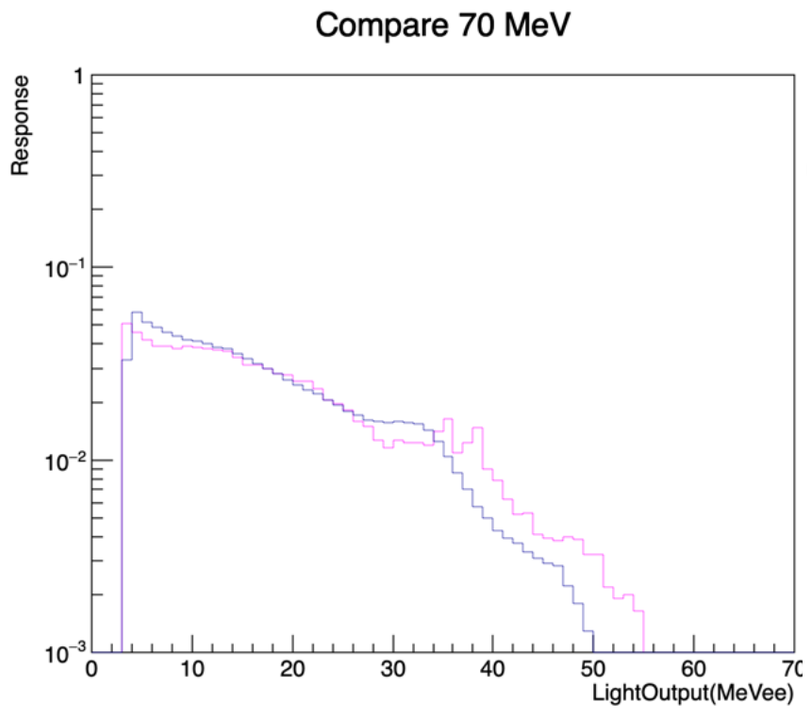
Plans

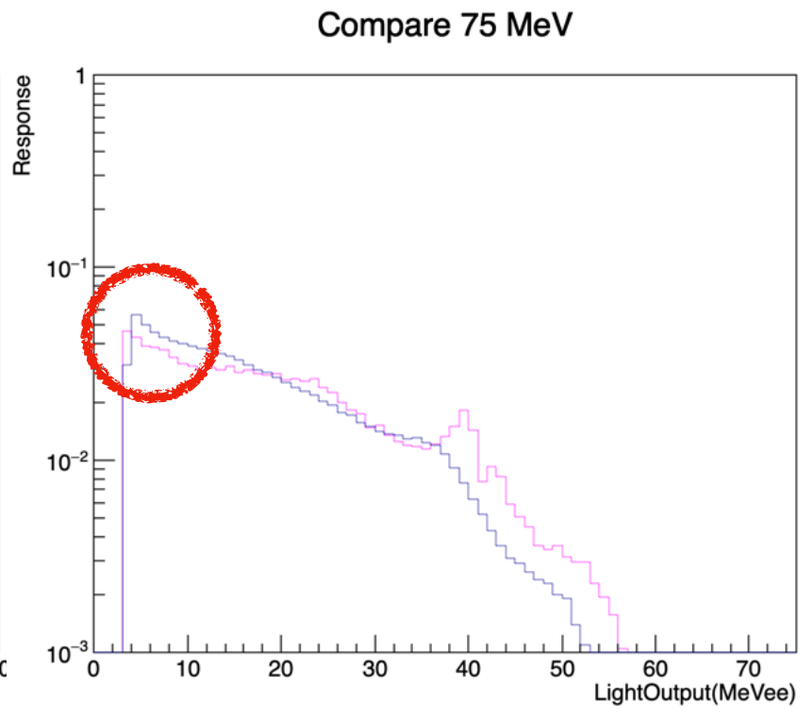
65-75 MeV

Simulation

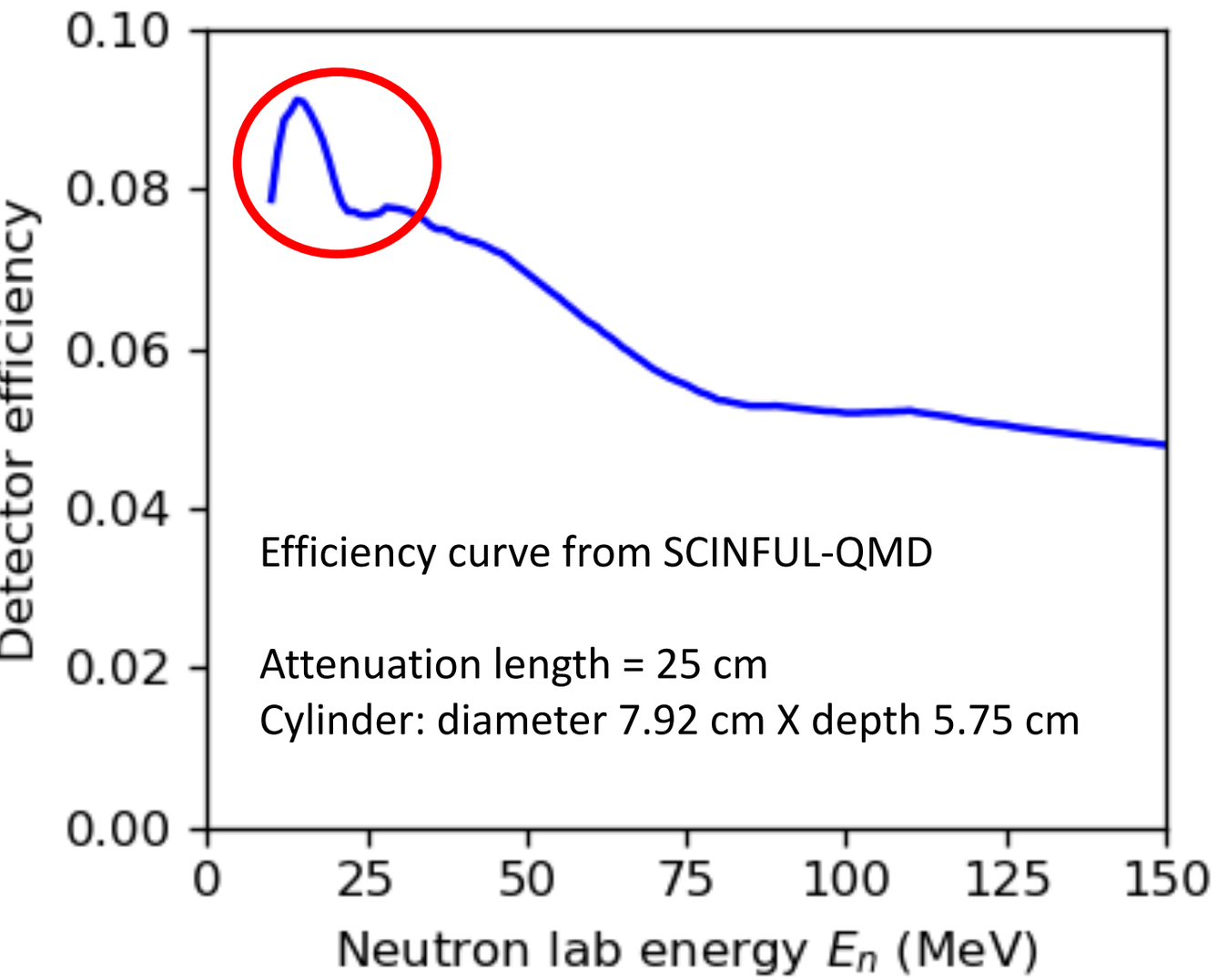
Exp data



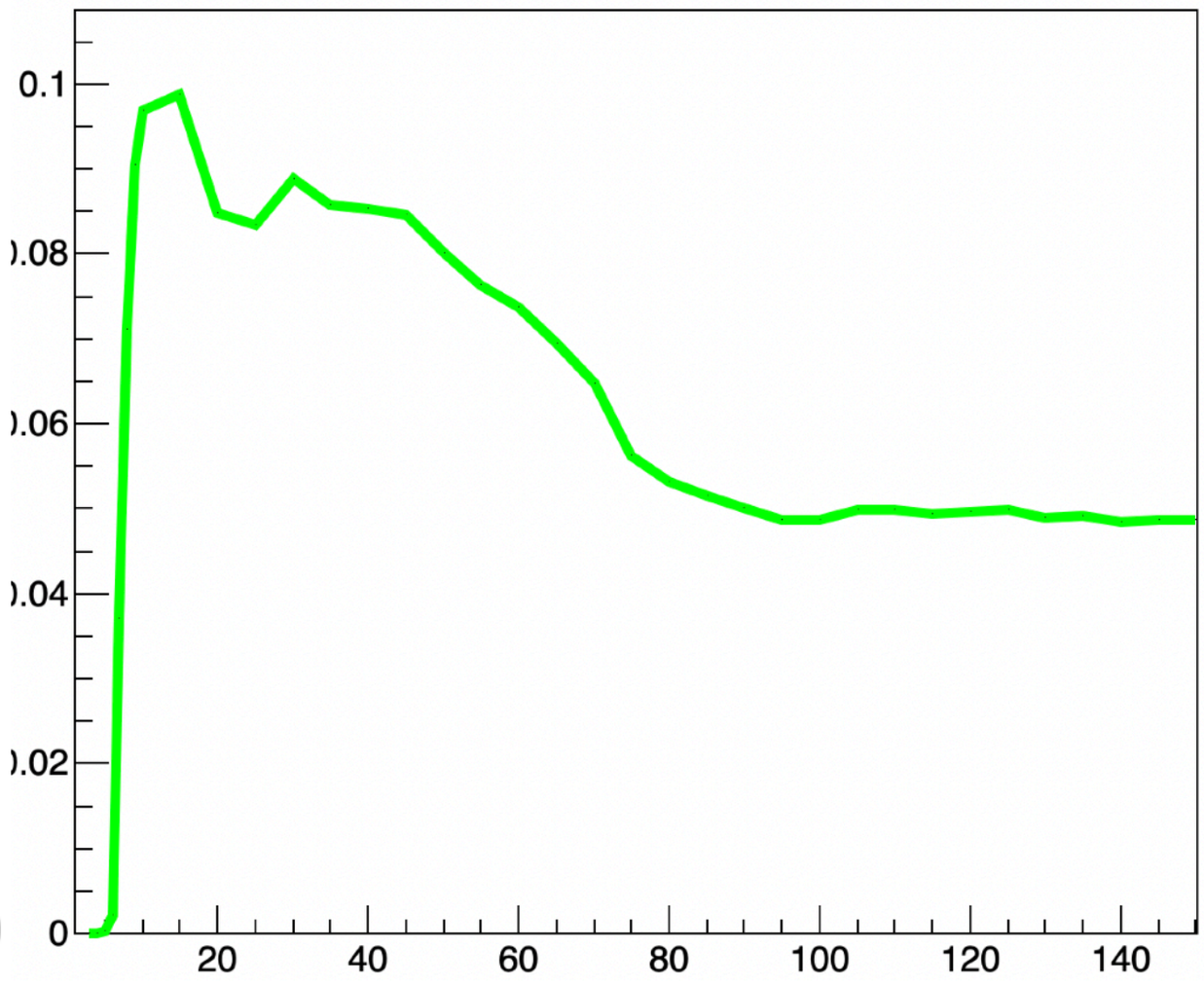




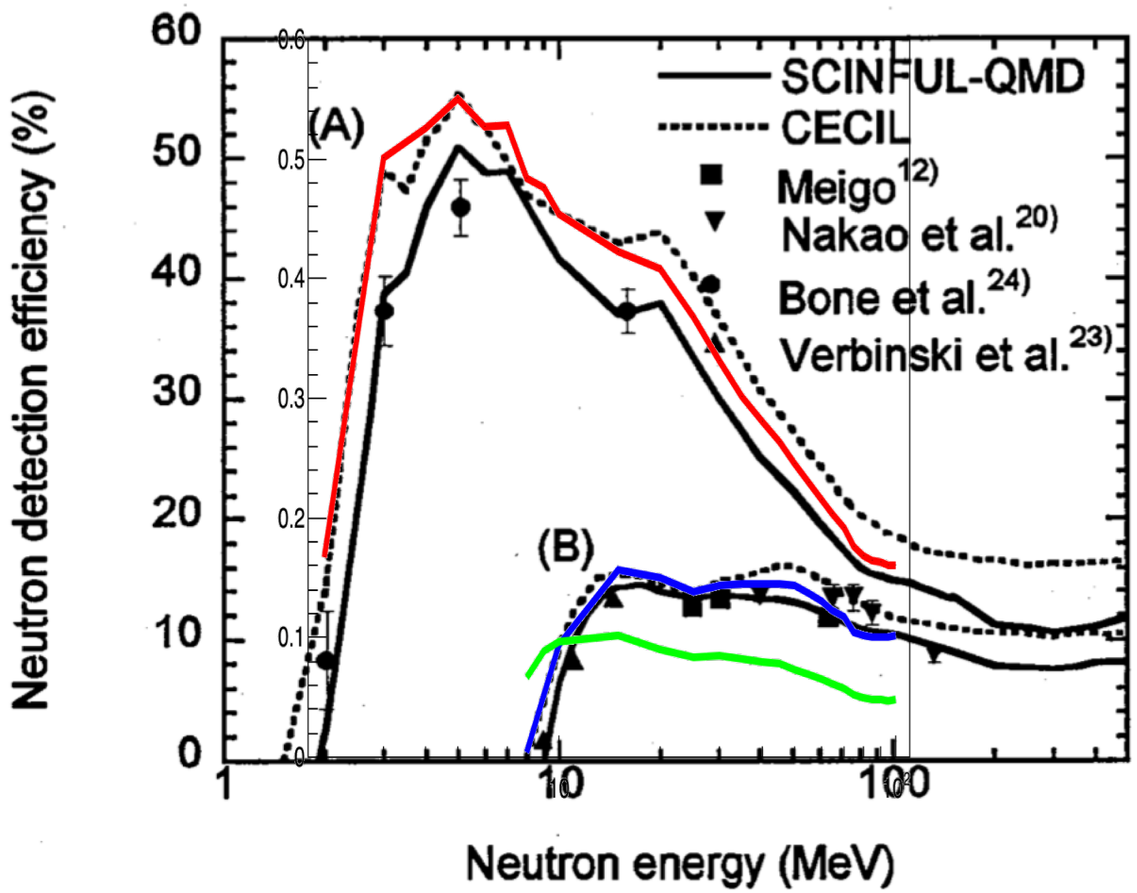
Plans

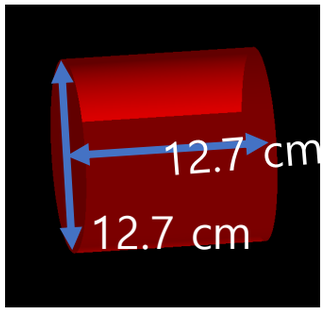


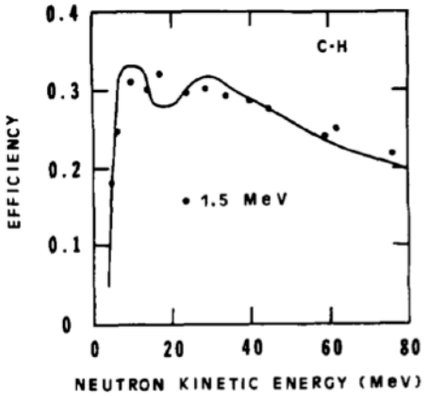
Bar type Efficiency

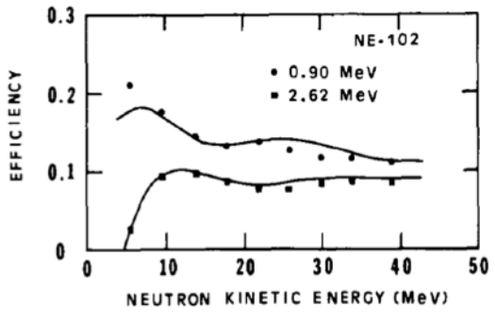


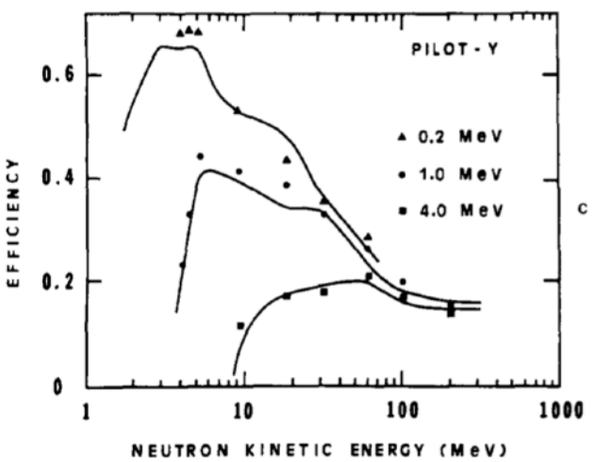
Plans

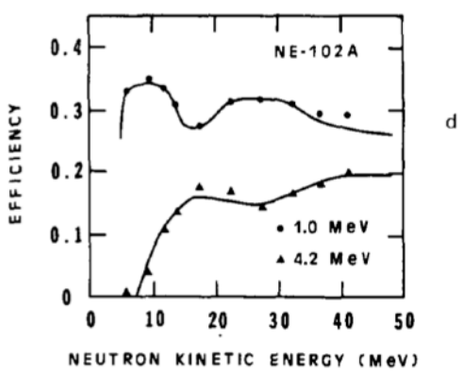








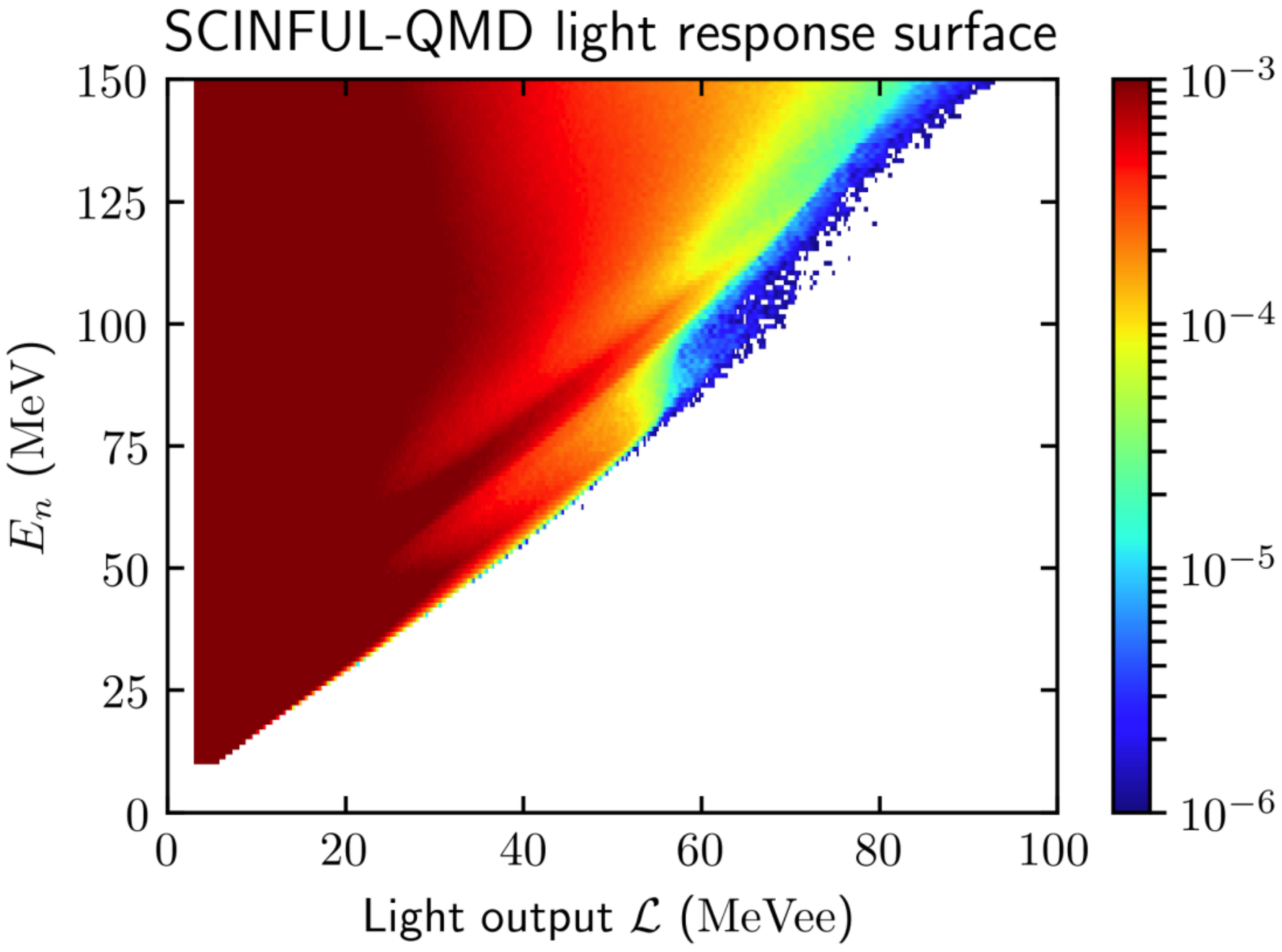




A : 12.7 cm diameter, 17.78 cm thickness, 0.45 MeVee l
B : 12.7 cm diameter, 12.7 cm thickness, 4.33 MeVee bi
C : 2 m long bar, (6.35-0.6) cm thickness, 3 MeVee bias

R.A. Cecil, B.D. Anderson, R. Madey,
Nuclear Instruments and Methods, Volume 161, Issue 3,1979, Pages 439-447,

Plans


SCINFUL-QMD light response surface
150
125
100
75
50
25
0
E_n (MeV)
0
20
40
60
80
100
Light output $\mathcal{L}$ (MeVee)
10^{-3}
10^{-4}
10^{-5}
10^{-6}