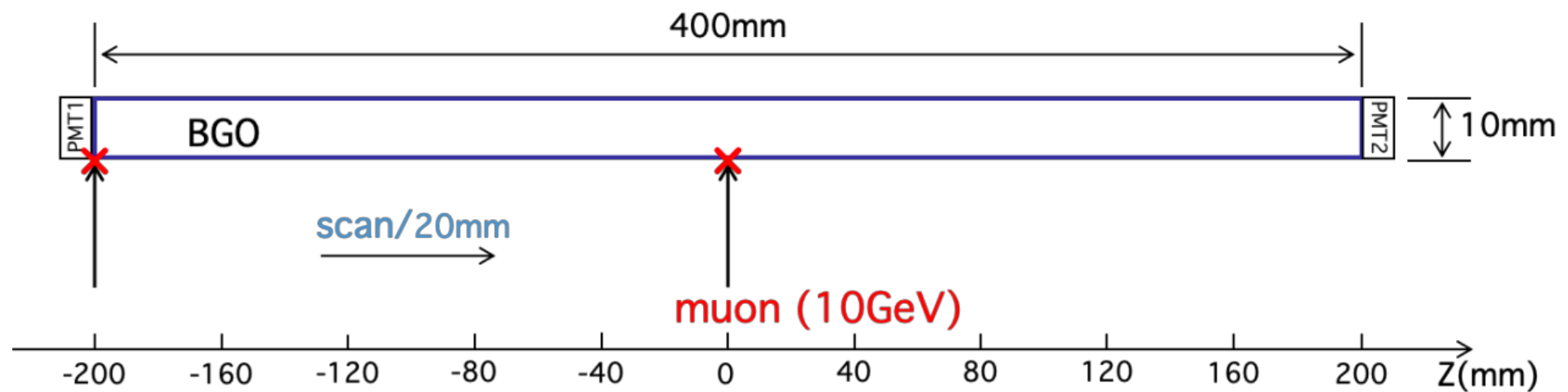


Simulation Progress on Crystal Based, Fast Timing ECAL Design

Yuxin Wang
2019.01.18

单根闪烁晶体的本征时间分辨

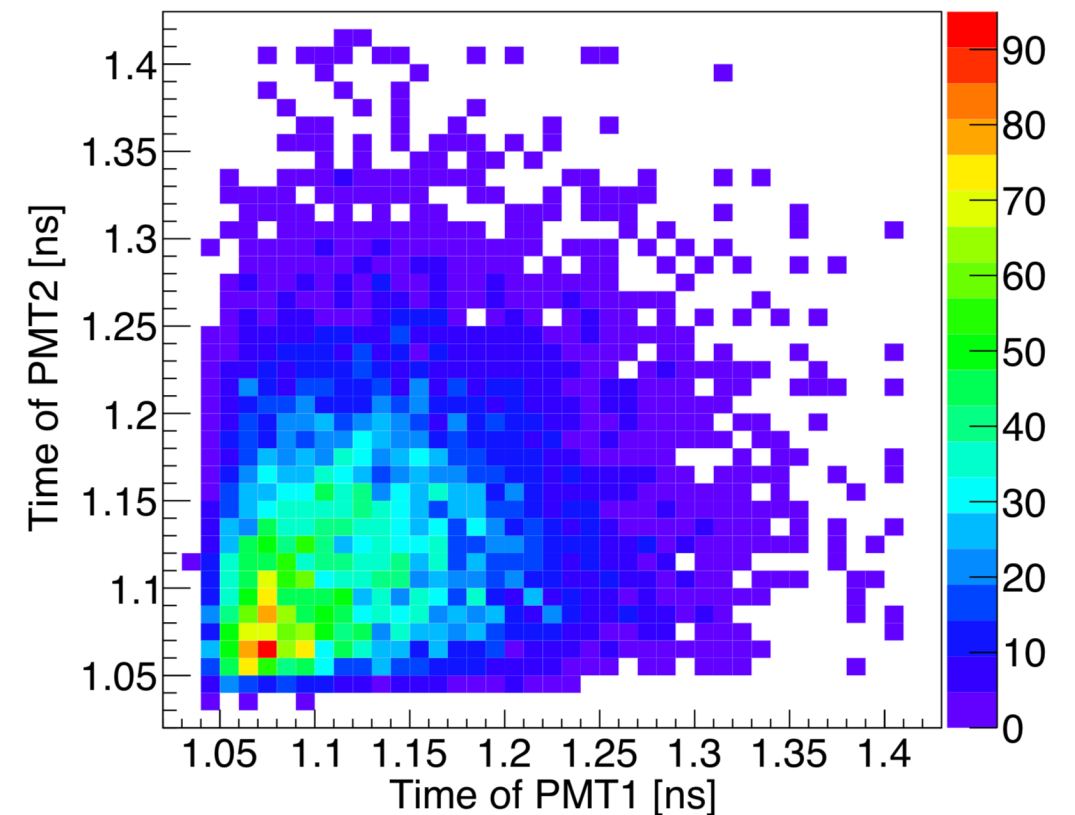
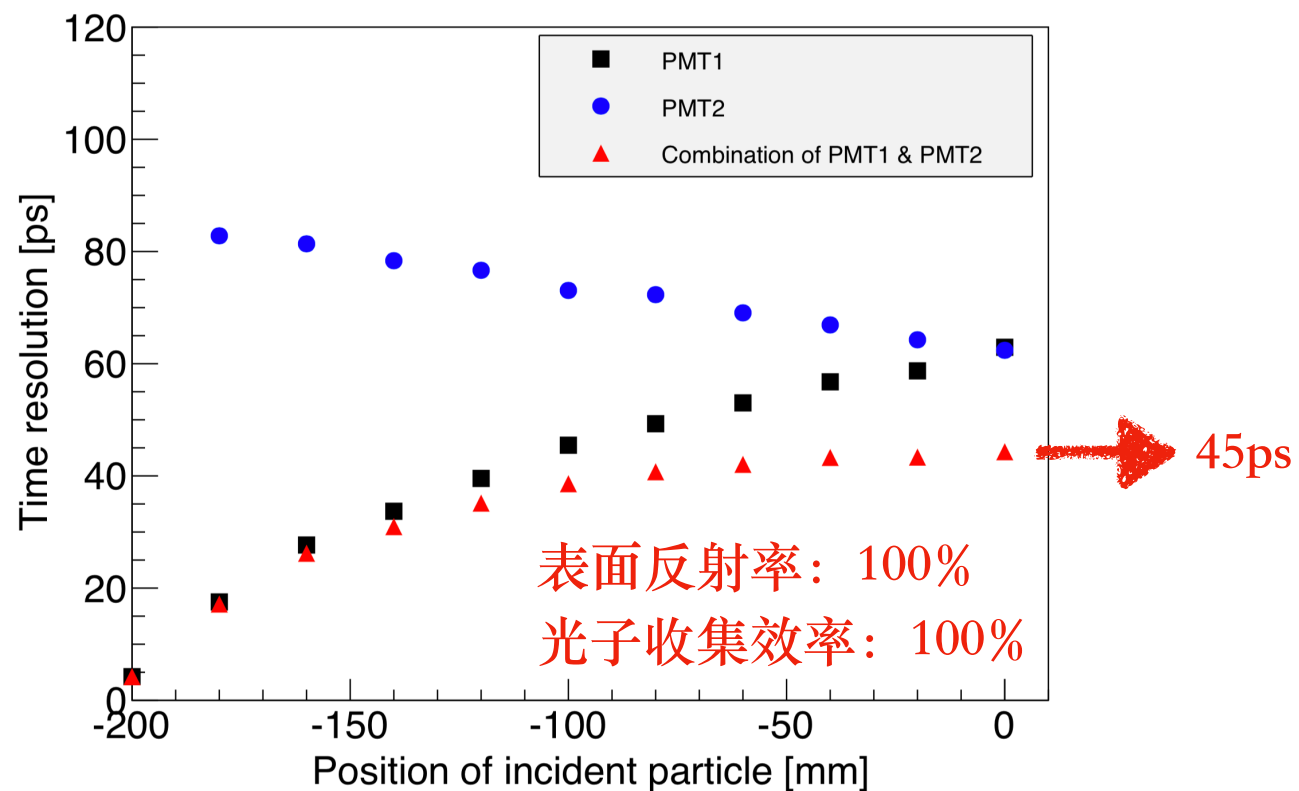
Parameter	Value
发光光谱峰位能量 Photon Energy	2.59eV (480nm)
发光光谱半峰宽 Photon Energy Width	0.6987eV (420-550nm)
快成分时间常数 FastTime Constant	60ns
慢成分时间常数 SlowTime Constant	300ns
光衰减长度 Absorption Length	7-15m
光产额 Scintillation Yeild	9000-10000/MeV
折射率 Refractive Index	2.15



对入射粒子的击中位置、表面反射率和光子收集效率进行扫描

表面反射率 (r): 100/99/95/90%; 光子收集效率 (ColEff): 100/50/30/10%

单根闪烁晶体的本征时间分辨



单端读出: 5 - 90ps

双端读出: 5 - 45ps

两端测得的时间独立无关

单根闪烁晶体的本征时间分辨

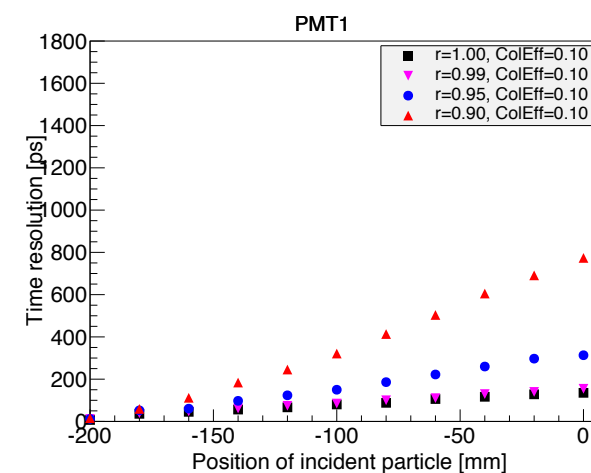
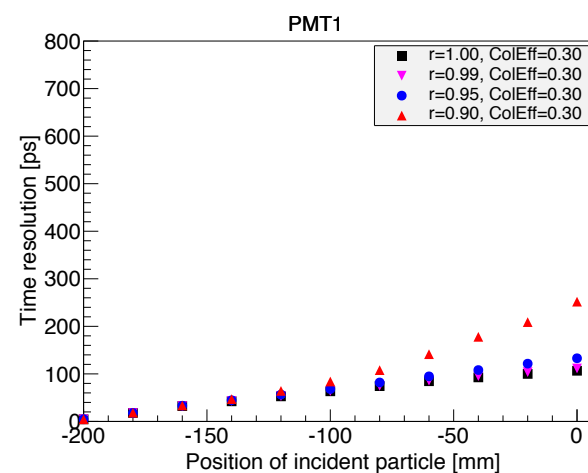
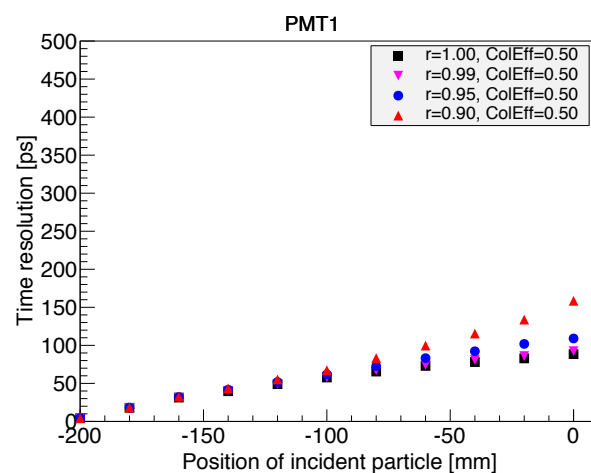
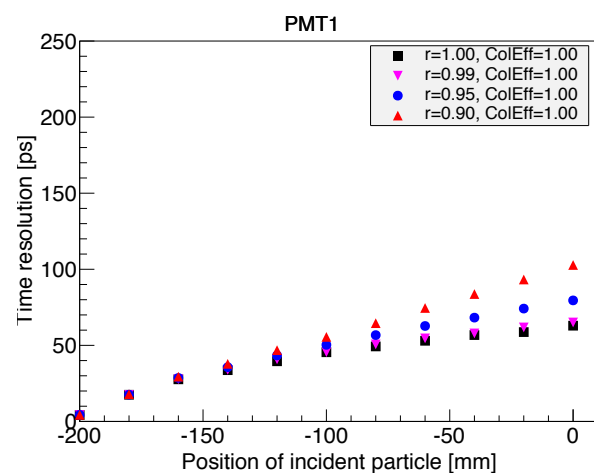
光子收集效率: 100%

50%

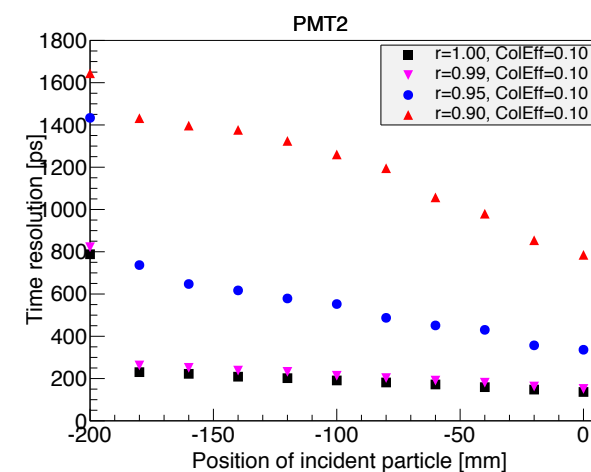
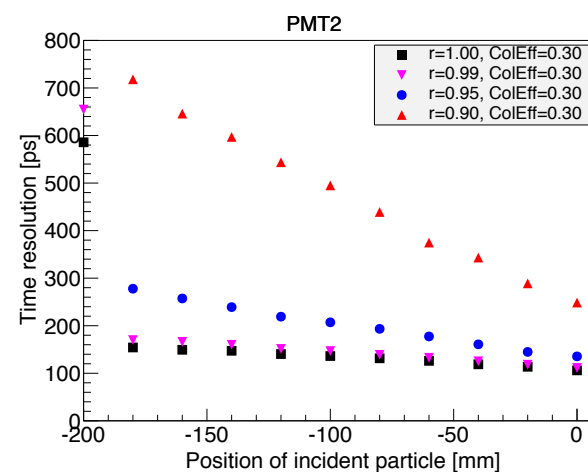
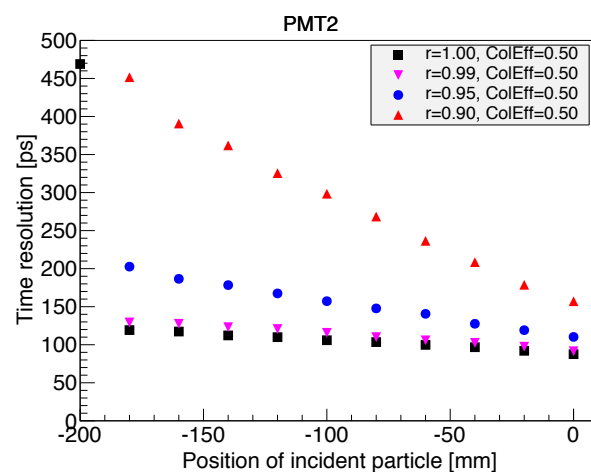
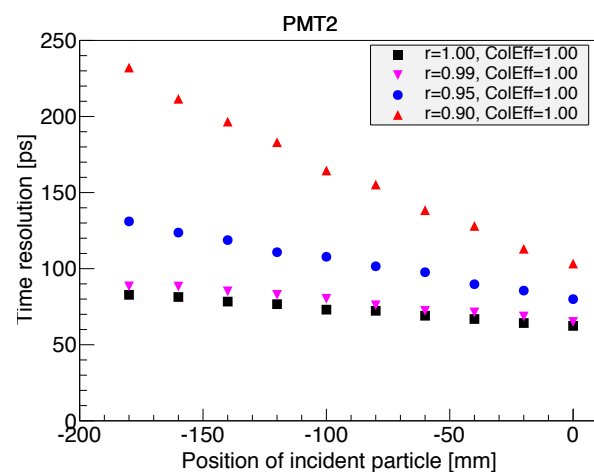
30%

10%

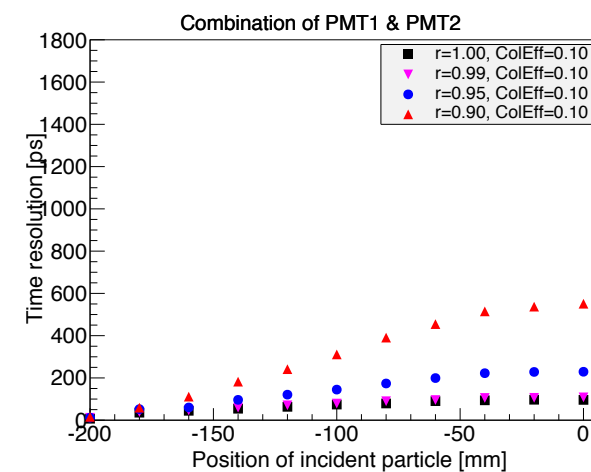
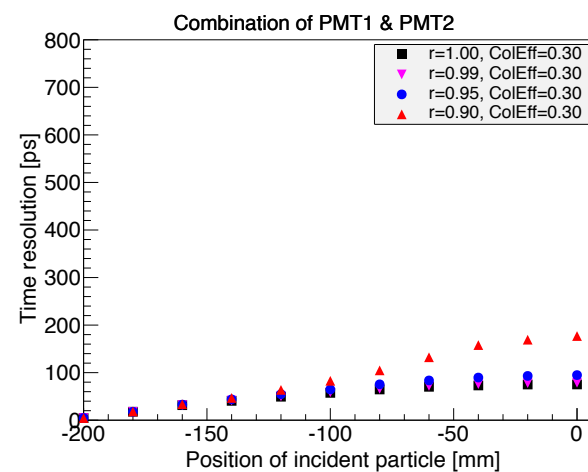
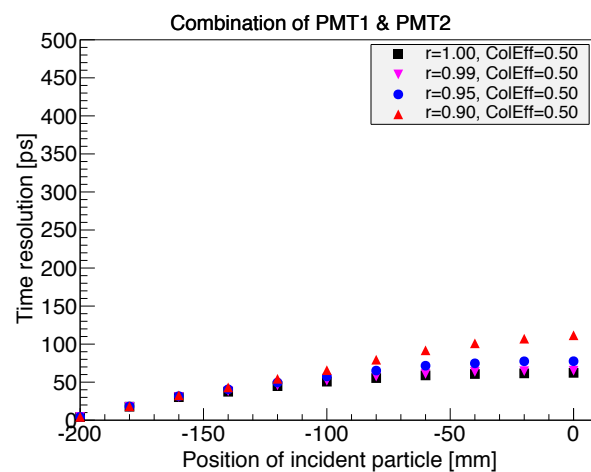
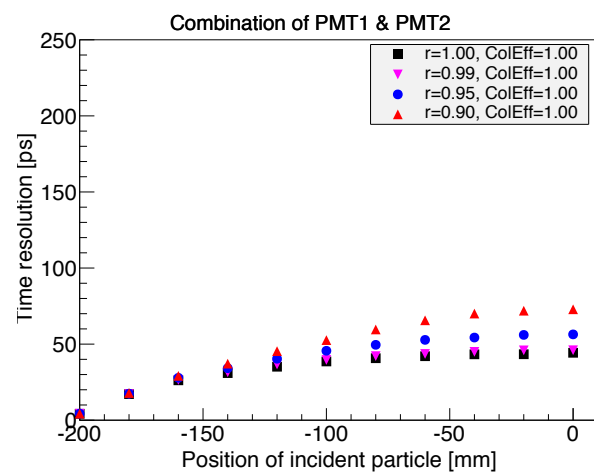
PMT1



PMT2



PMT1
&
PMT2



单根闪烁晶体的本征时间分辨

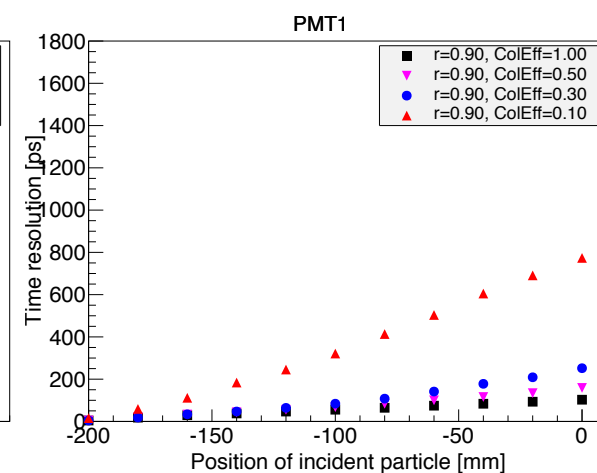
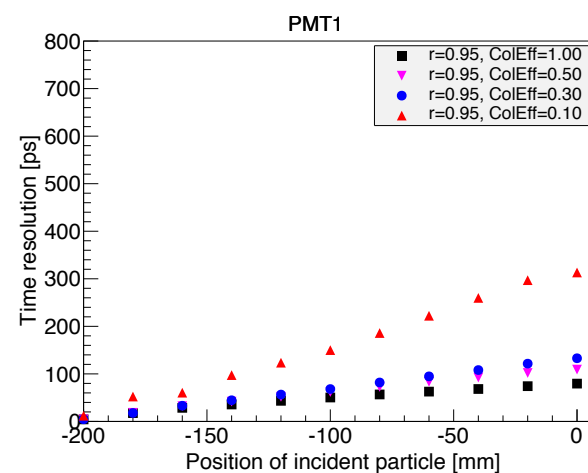
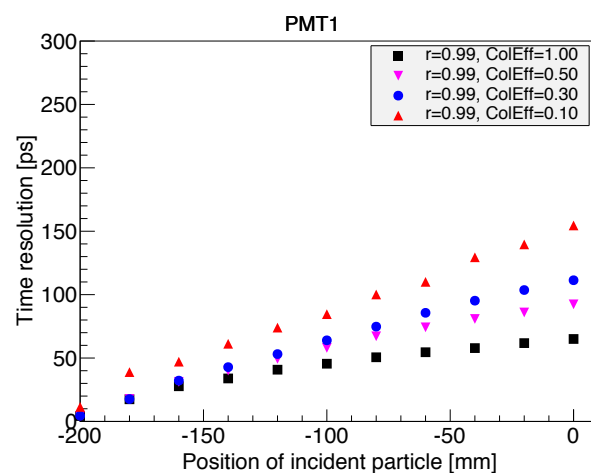
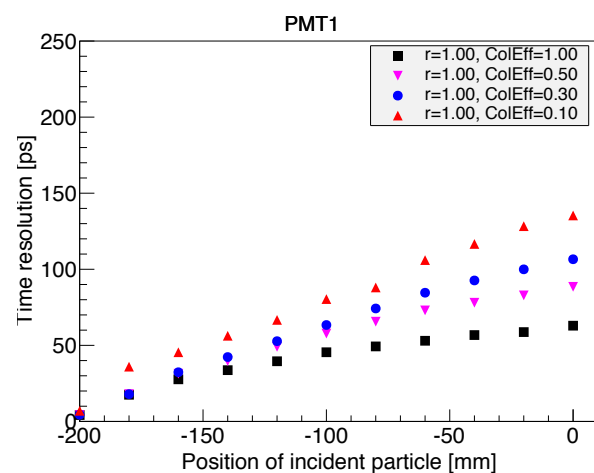
表面反射率: 100%

99%

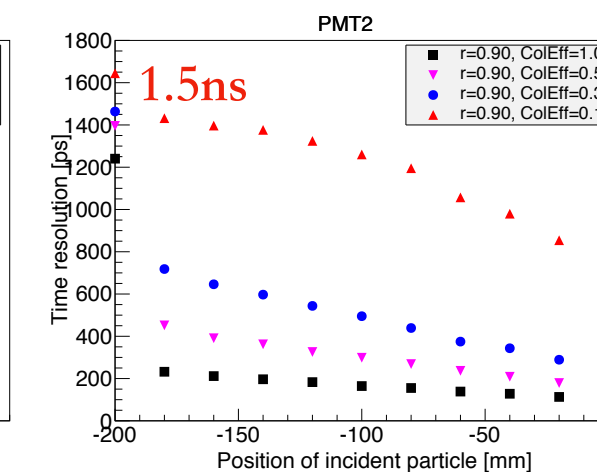
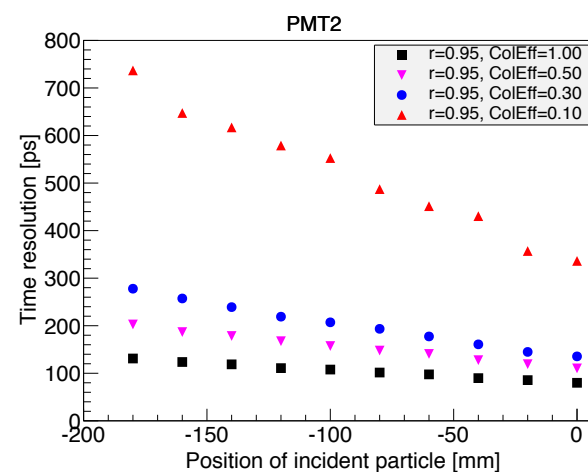
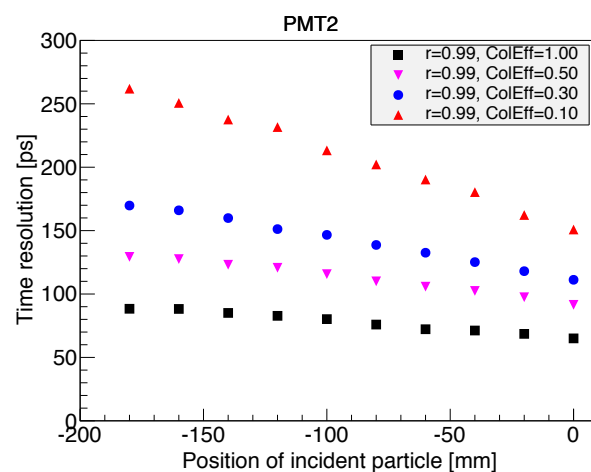
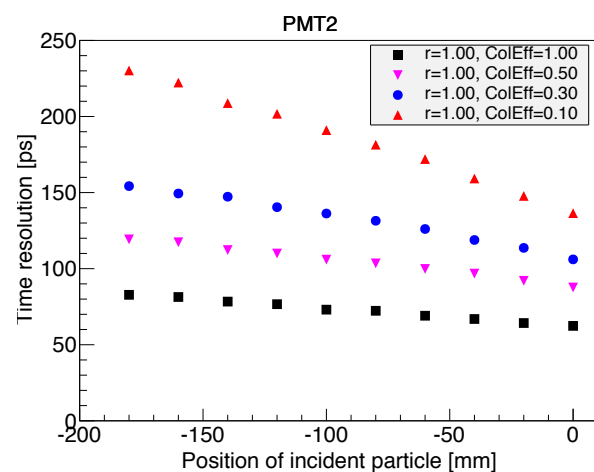
95%

90%

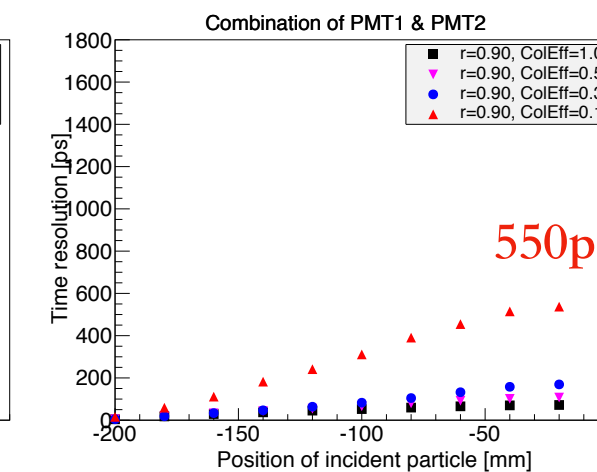
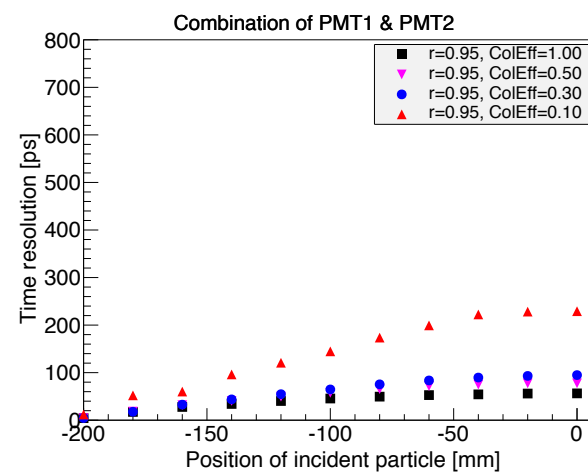
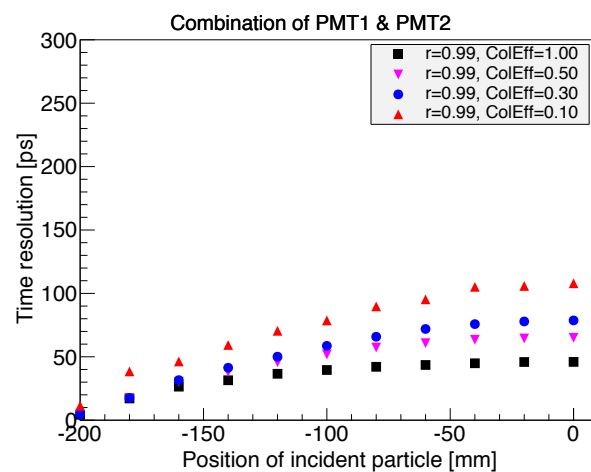
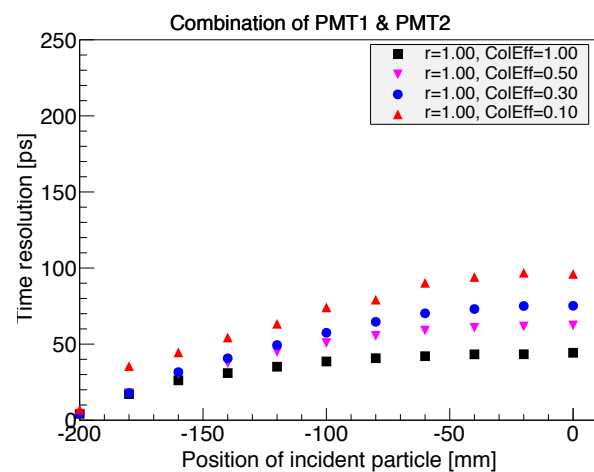
PMT1



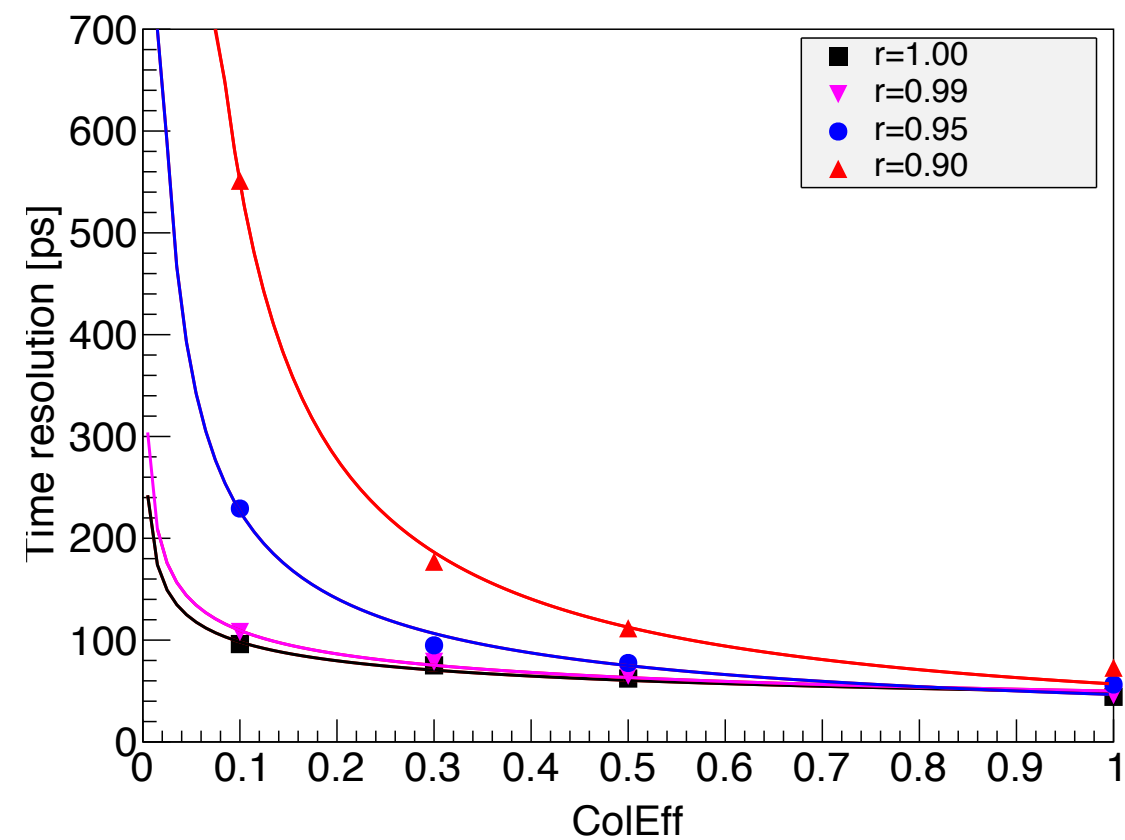
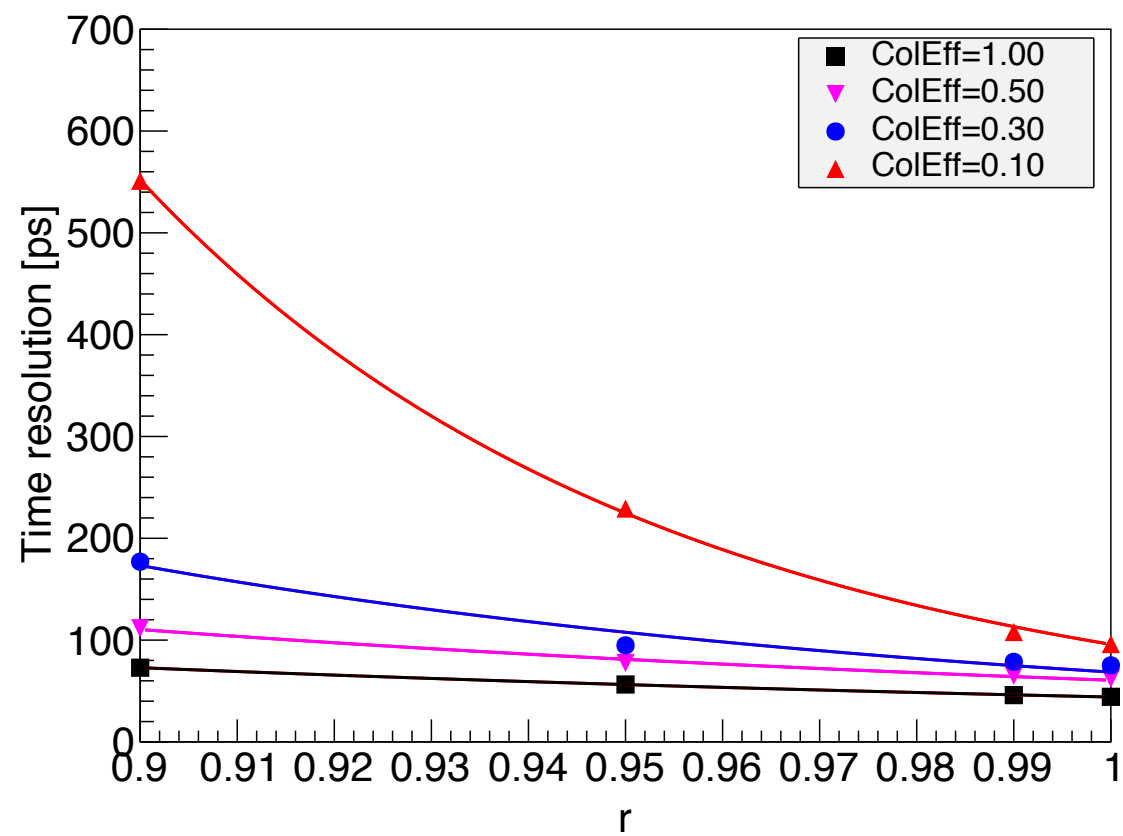
PMT2



PMT1
&
PMT2

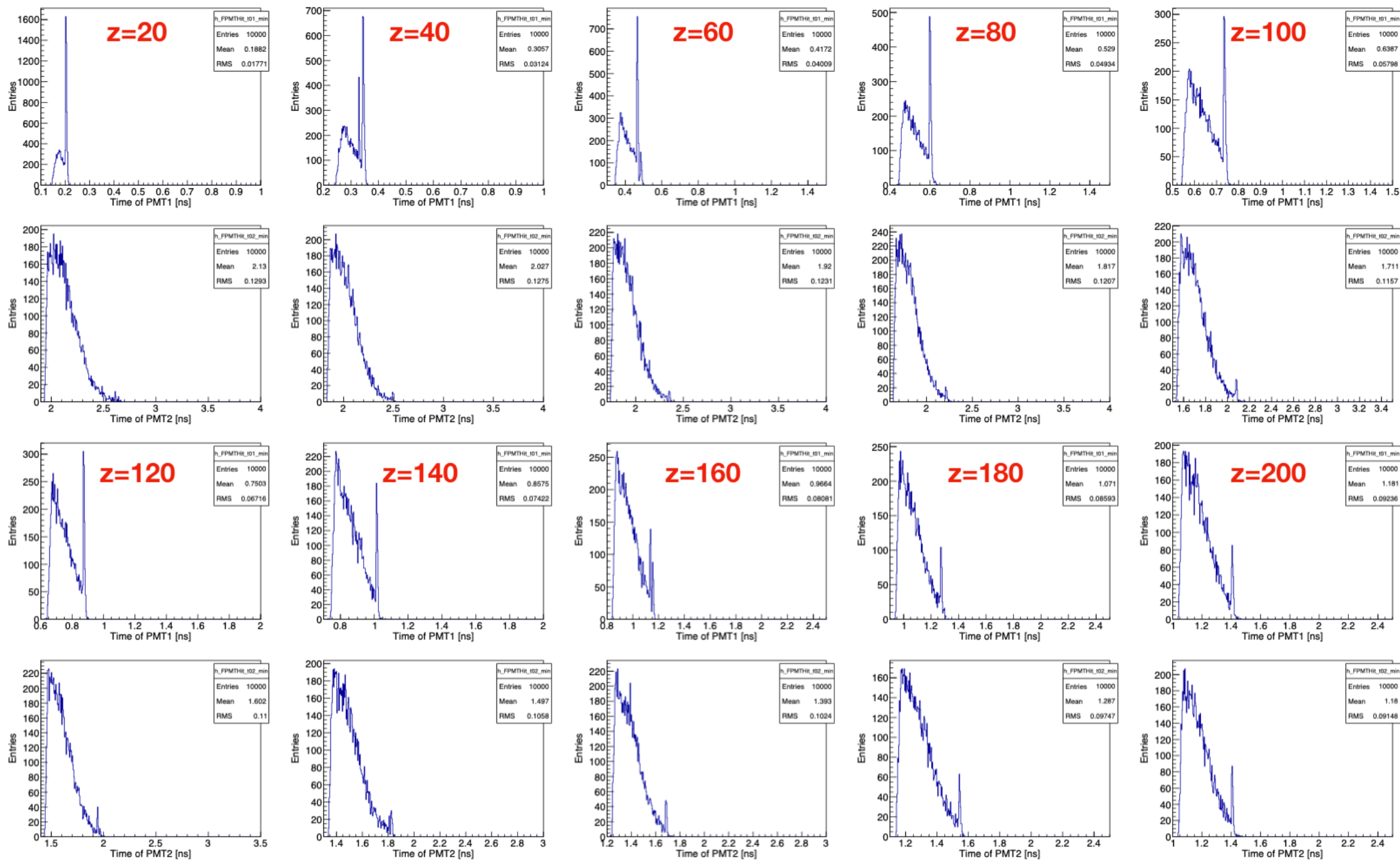


单根闪烁晶体的本征时间分辨



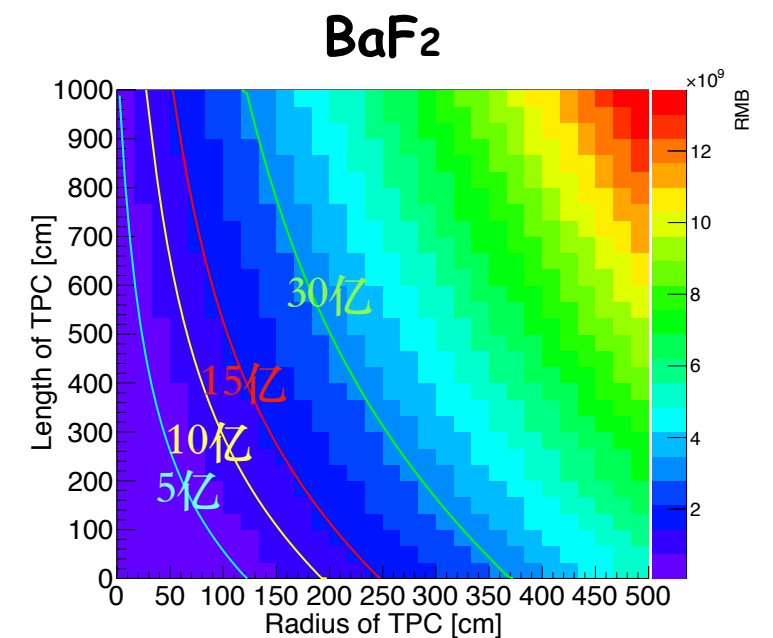
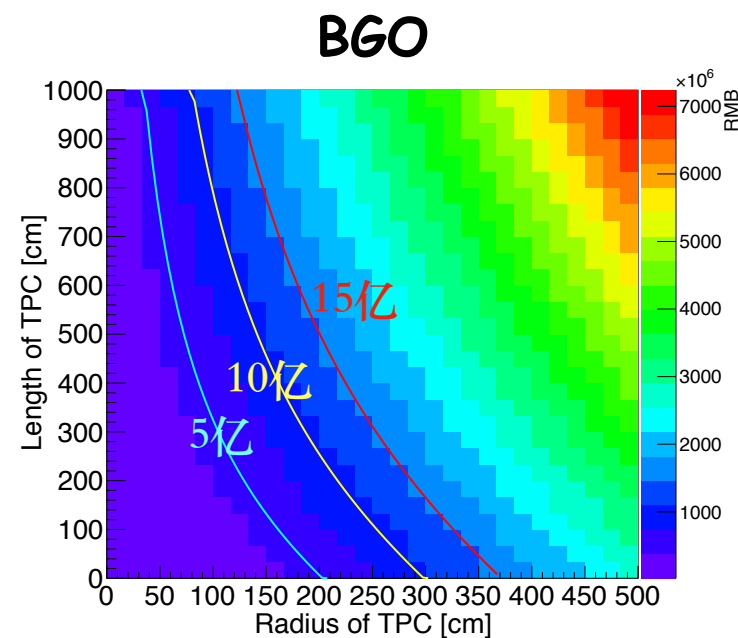
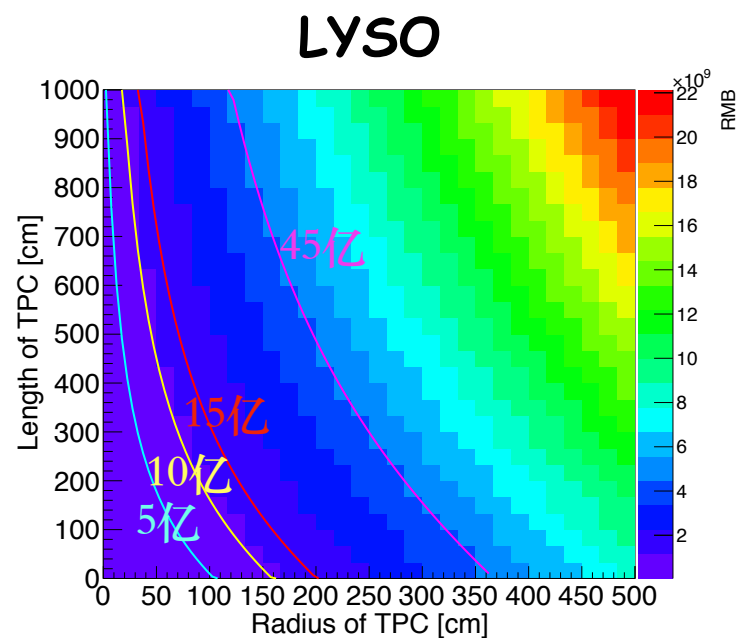
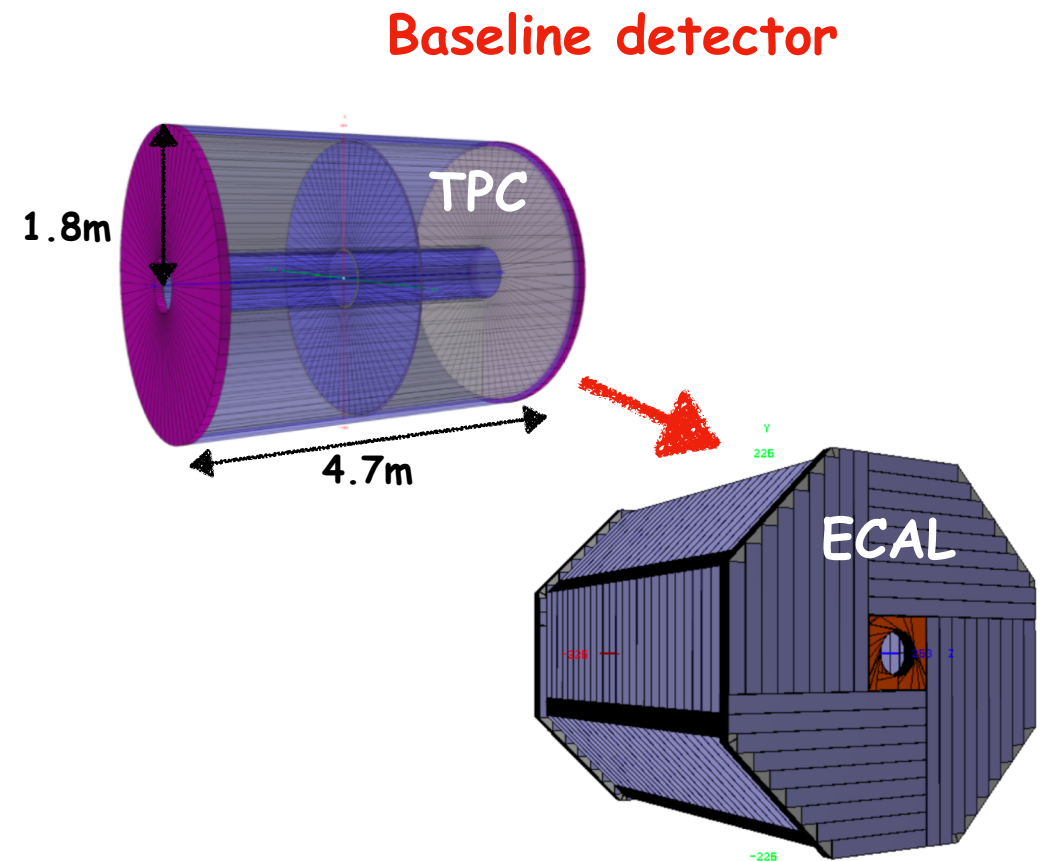
单根闪烁晶体的本征时间分辨

ColEff=50, r=99



晶体选型及造价估算

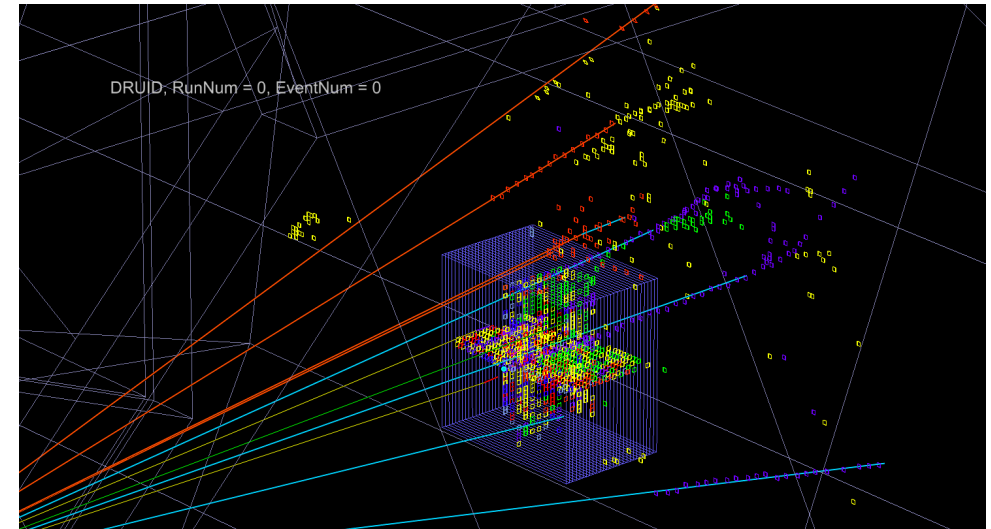
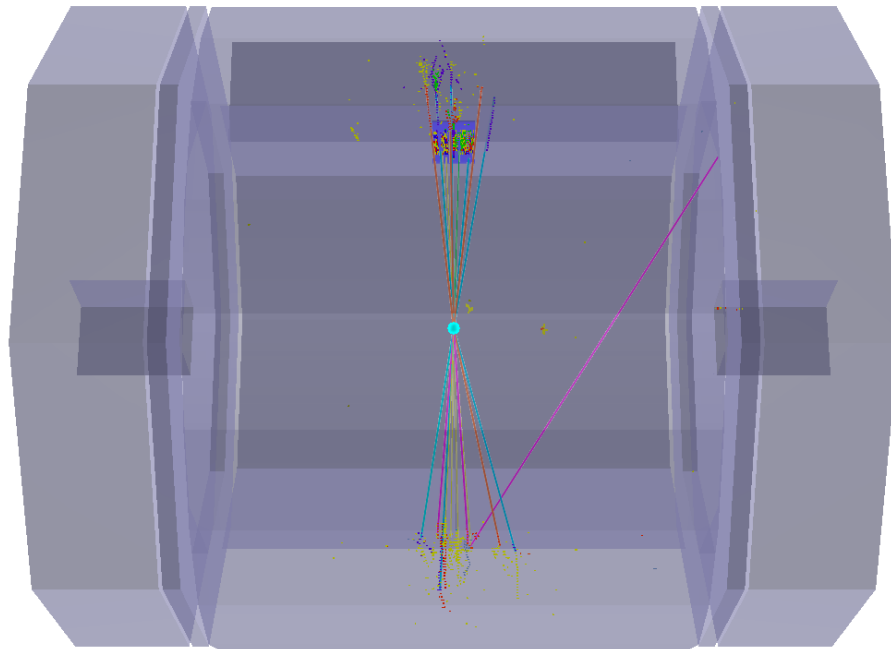
	LYSO	BGO	BaF2
Light Yield (/MeV)	27000	9000-10000	2000 (in first 2ns)
Decay time (ns)	40	fast 60 slow 300	fast 0.6(~2) slow 600
Density (g/cm ³)	7.40	7.13	4.89
Radiation Length X ₀ (cm)	1.14	1.12	2.03
Growth Length (cm)	20	26-30 (常规) 60 (目前最长) 80-100 (正在研制)	20 40 (正在研制)
Price (\$/cm ³)	30-40	10	10-15
Lowest Price (\$/cm ³)	24	8	8
24X ₀ (cm)	27.36	26.88	48.72
Total Volume (m ³)	27.25	26.72	53.28
Total Cost (亿)	57.23-76.31	18.70	37.29-55.94
Lowest Total Cost (亿)	45.79	14.96	29.84
Number of Crystals (万)	57-68	55-67	116-133
Number of readout channels (万)	114-136	110-134	232-266



Particle Separation in Jet

New Ecal Module + CEPC_v4 Hcal

DRUID, RunNum = 0, EventNum = 0



* Row *	* Instance *	* EvtNum *	* nGenFSP_A *	* nGenFSP_A *	* TotEnergy *	* PDG_AllIn *	* Energy_A1 *
* 2013 - Particle *	* 0 *	* 0 *	* 45 *	* 9 *	* 24.571874 *	* -211 *	* 9.1035296 *
* particle. 0 *	* 1 *	* 0 *	* 45 *	* 9 *	* 24.571874 *	* -211 *	* 1.7714536 *
* 0 *	* 2 *	* 0 *	* 45 *	* 9 *	* 24.571874 *	* 22 *	* 0.6440772 *
* 0 *	* 3 *	* 0 *	* 45 *	* 9 *	* 24.571874 *	* 22 *	* 1.6211277 *
* 0 *	* 4 *	* 0 *	* 45 *	* 9 *	* 24.571874 *	* 130 *	* 3.4874744 *
* A Pr 0 *	* 5 *	* 0 *	* 45 *	* 9 *	* 24.571874 *	* -211 *	* 4.9082331 *
* introdu 0 *	* 6 *	* 0 *	* 45 *	* 9 *	* 24.571874 *	* 22 *	* 0.3189898 *
* 0 *	* 7 *	* 0 *	* 45 *	* 9 *	* 24.571874 *	* 22 *	* 2.0230079 *
* 0 *	* 8 *	* 0 *	* 45 *	* 9 *	* 24.571874 *	* 22 *	* 0.6939808 *

DRUID, RunNum = 0, EventNum = 0

CEPC_v4 Ecal

