SimpleOpticsZPencil

Bill Worstell

PicoRad Imaging

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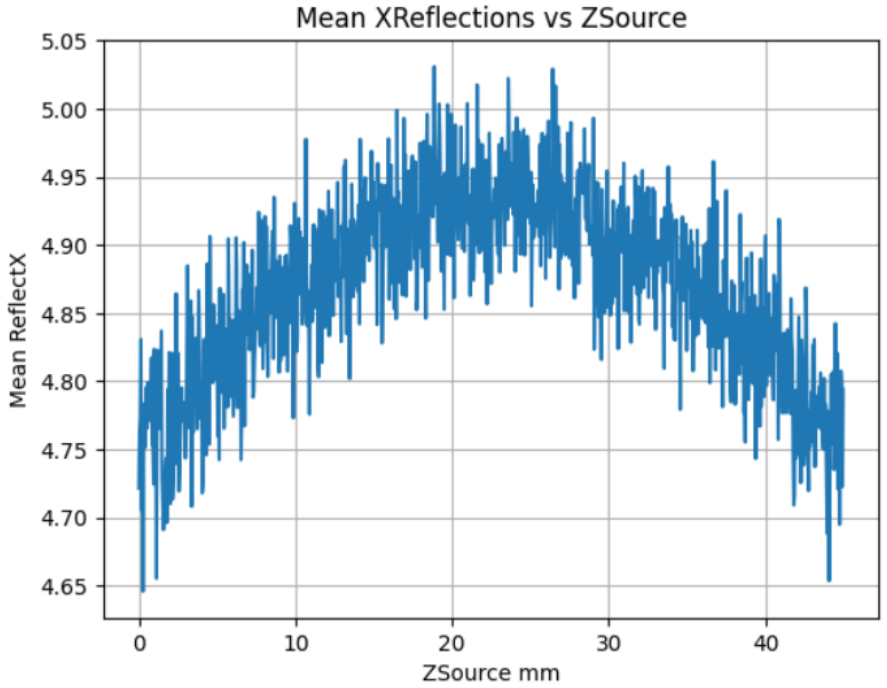
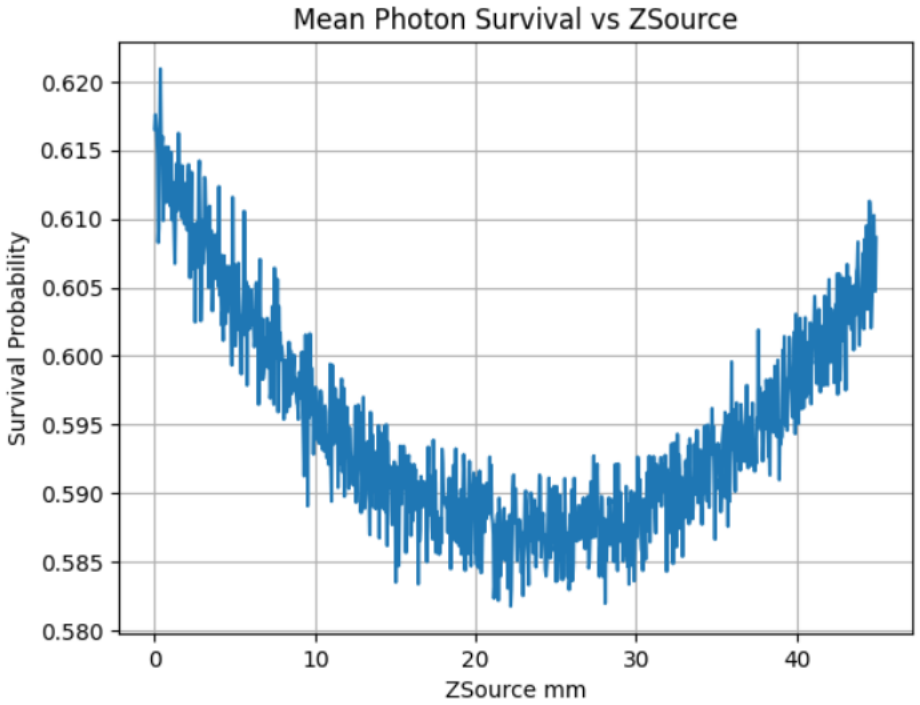
Mean Photon Survival is nearly independent of Depth of Interaction Z

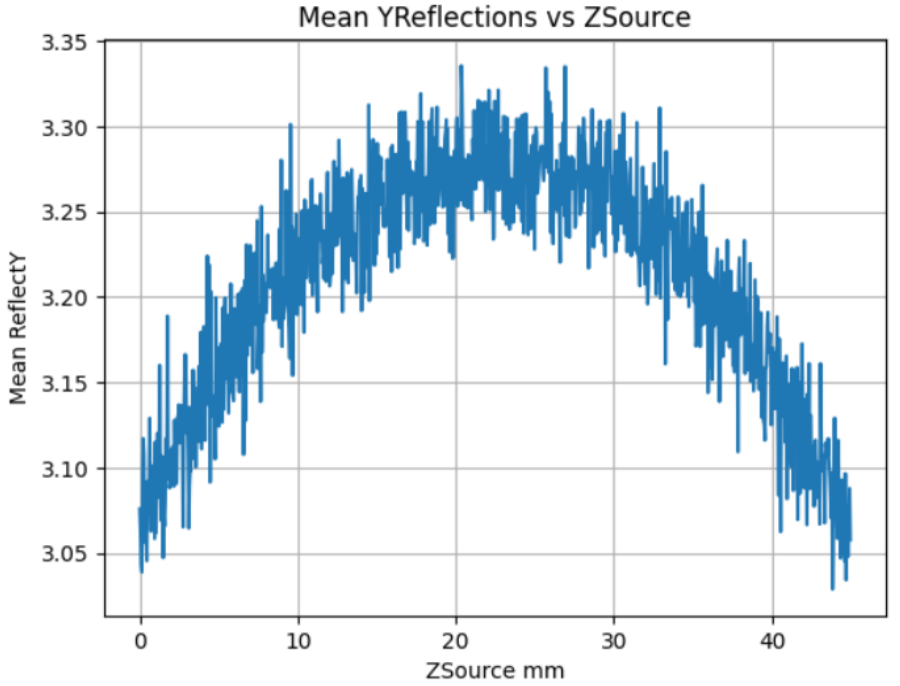
SimpleOpticsZPencil.ipynb

```
NEvents: 1000
ic| SqrtNPhotons: 100
ic| XBounds: [1.5, 1.5]
ic| YBounds: [-3.0, -3.0]
ic| ZBounds: [0, 45.0]
ic| RegularZ: True
ic| XSource.size(): torch.Size([1000, 10000])
ic| YSource.size(): torch.Size([1000, 10000])
ic| ZSource.size(): torch.Size([1000, 10000]
```

```
# Index of refraction for optical barriers
#   (Air and LIOB=Laser Induced Optical Barrier)
IndexX=1.0
IndexY=1.40
#Number of photons to generate (511 keV x ideal photosensor)
NFast=172.
NSlow=1059.
# Index of refraction for fast and slow component
IndexFastBaF2=1.55
IndexSlowBaF2=1.50
# Reflectivity of mirrored surfaces
ReflectX=0.90
ReflectY=0.90
ReflectZ=0.90
```







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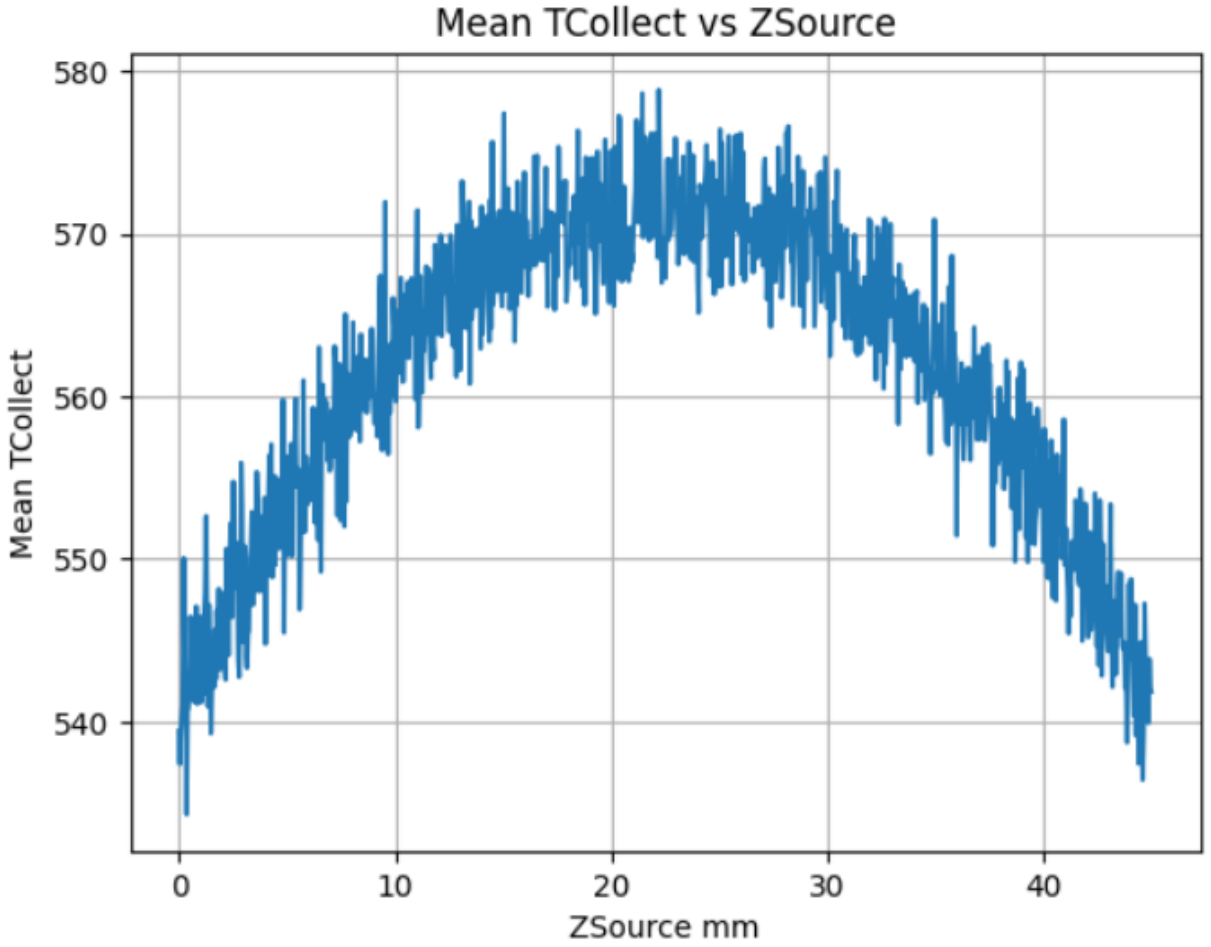
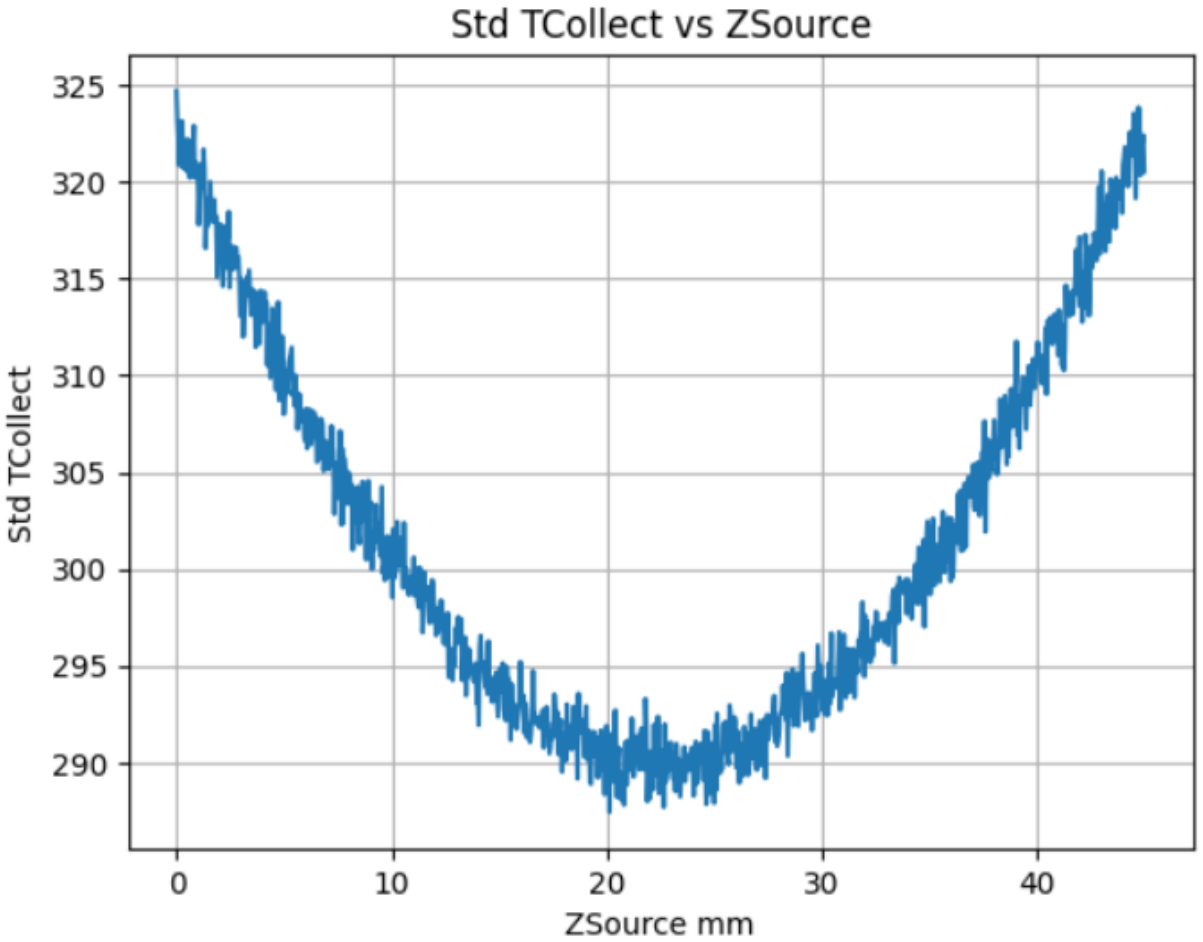
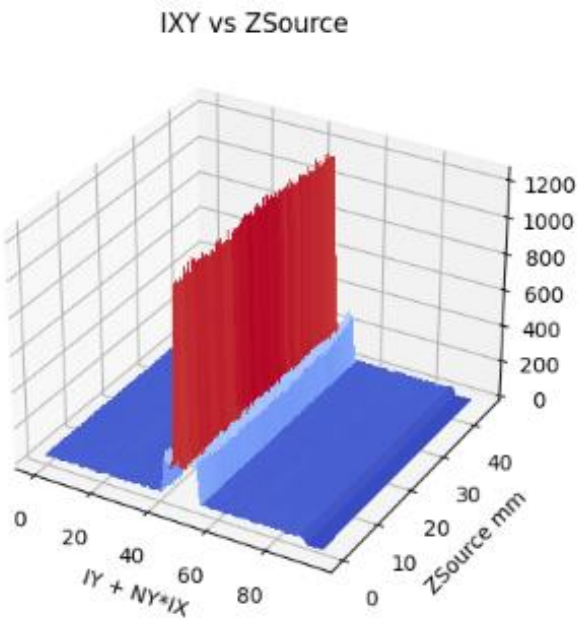
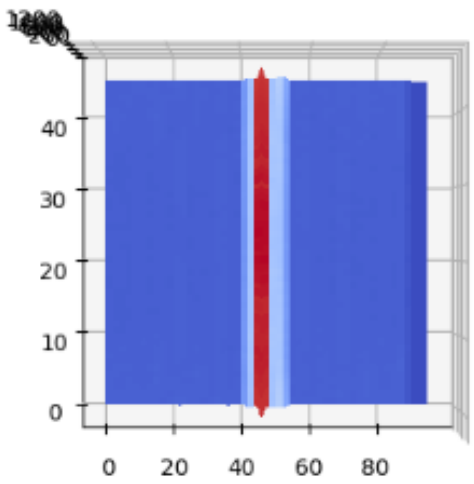
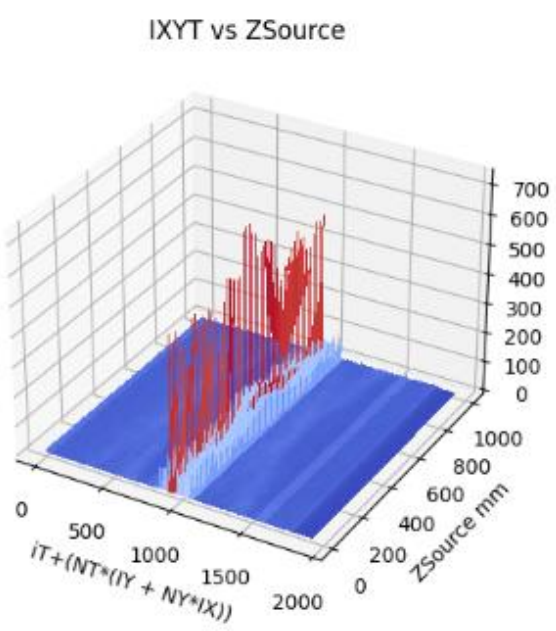
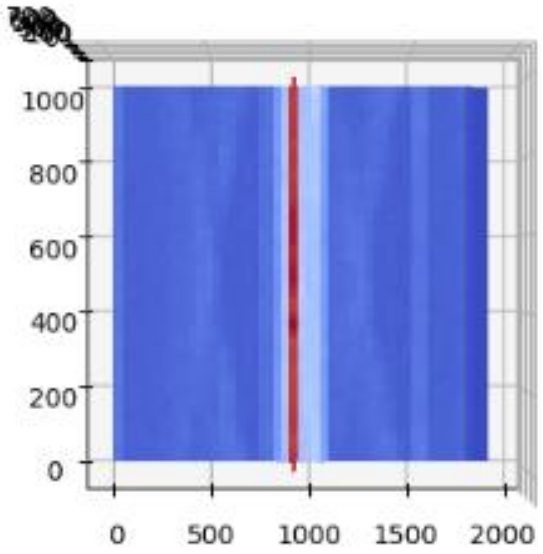


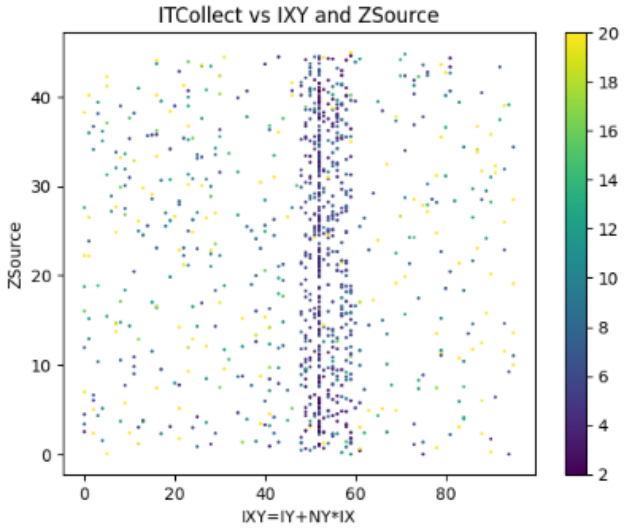


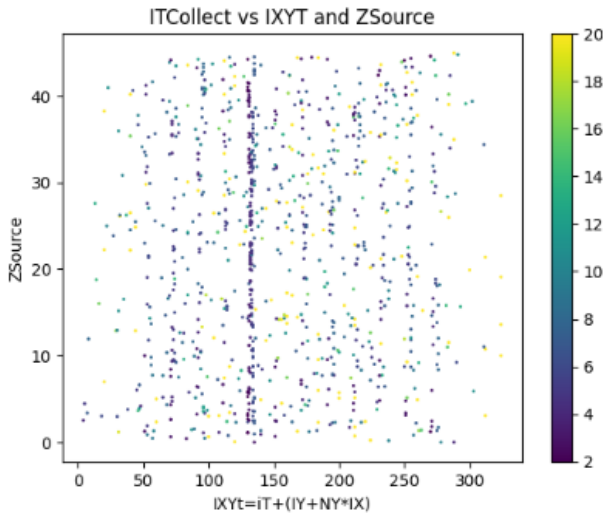


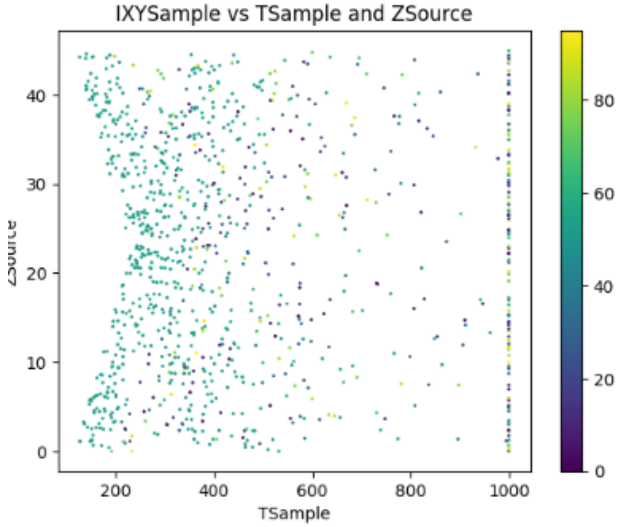


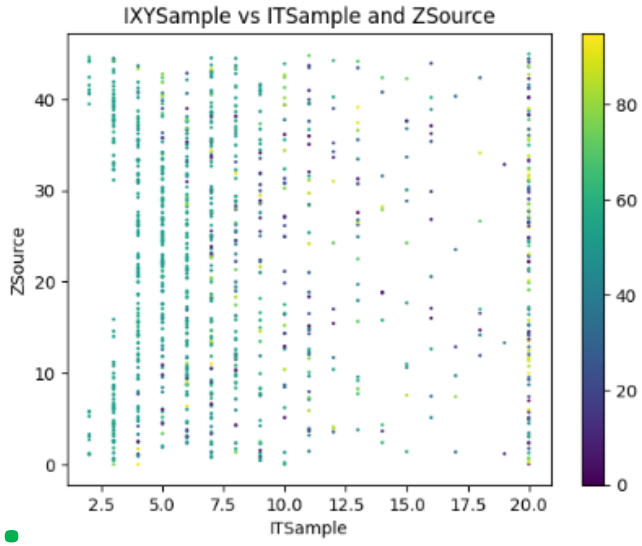






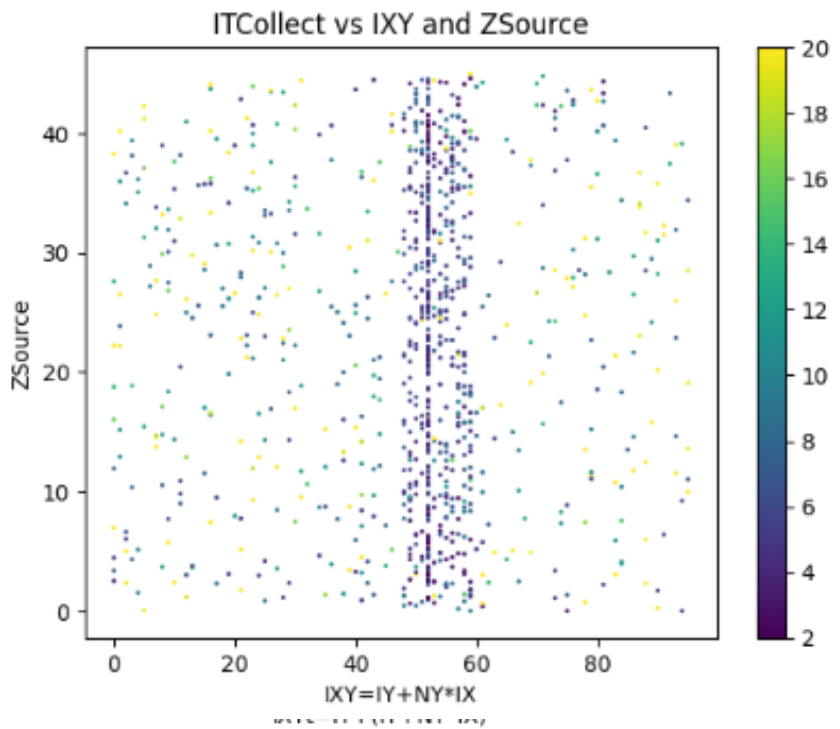


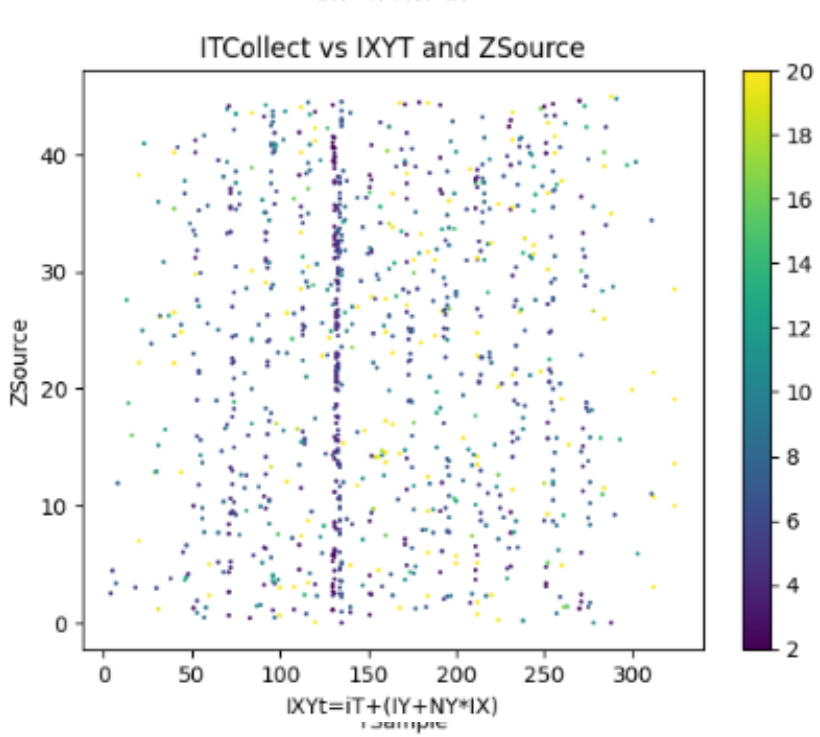


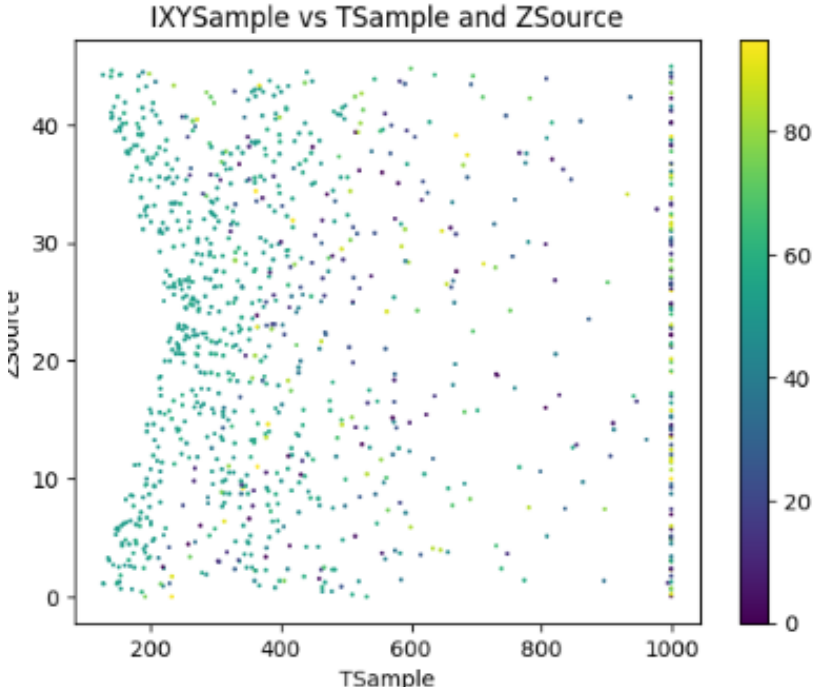


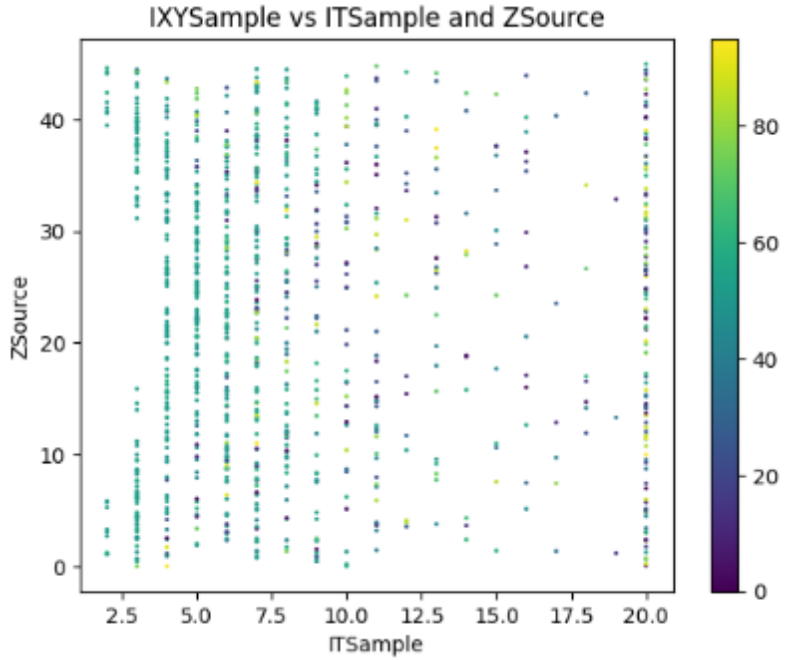
Detection coordinates and timing distributions are nearly Independent of Depth of Interaction Z

Scatterplots for randomly generated events from ZPencil selecting on photons is XY peak channel are reasonable









ZPencil

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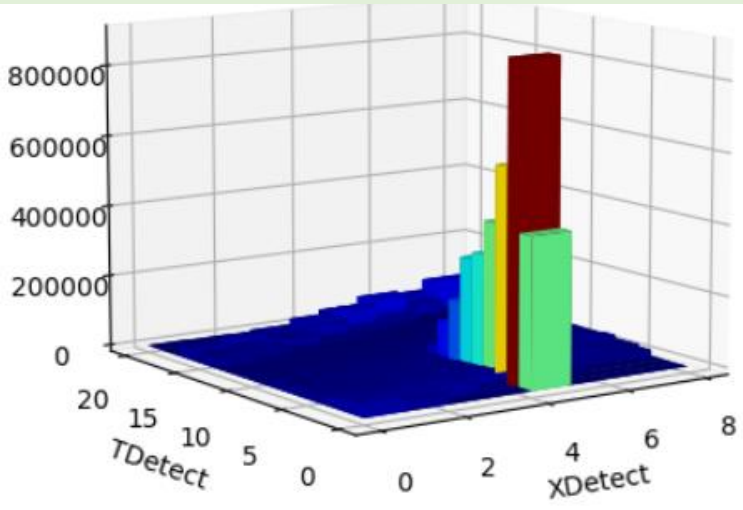
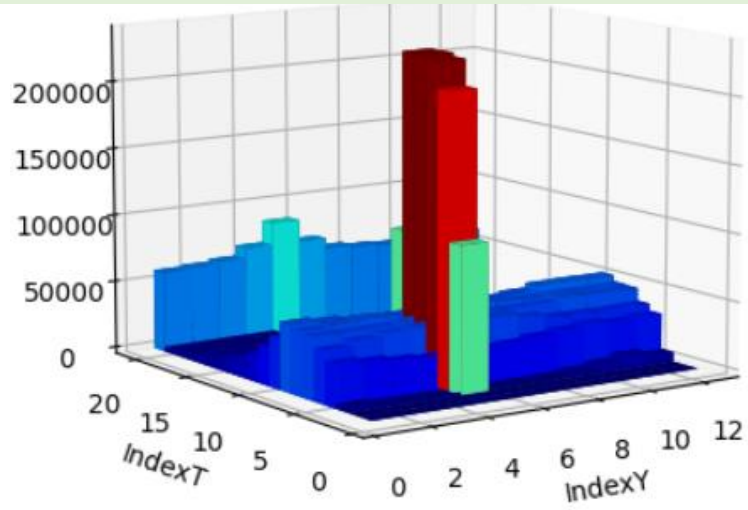
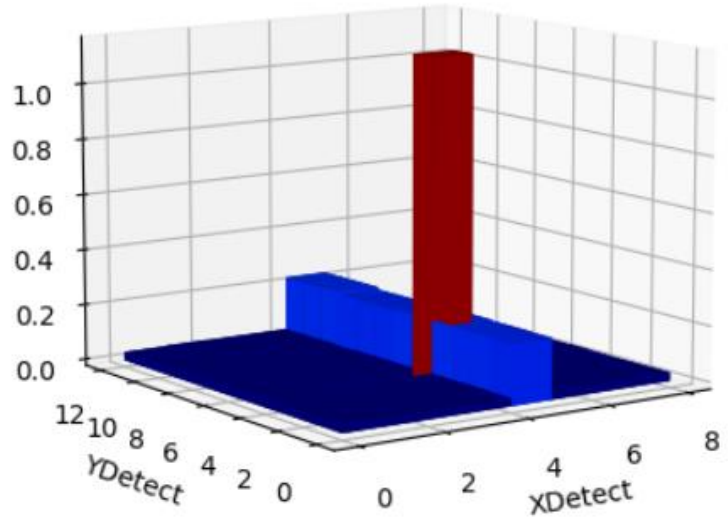
ZPencil

Integrals of projections over all regular Z generated events ffrom ZPencil are reasonble

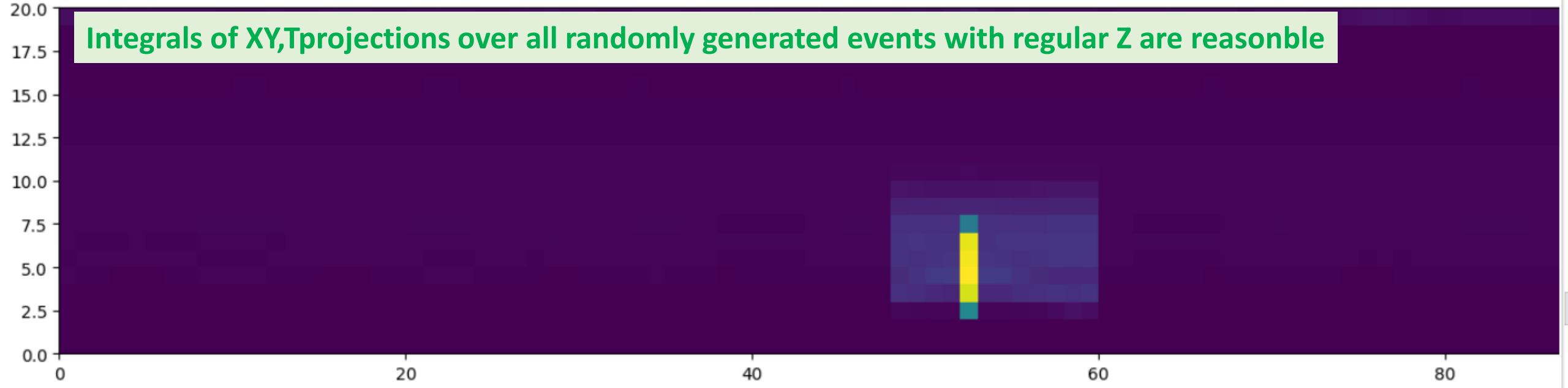






ZPencil

Integrals of XY,Tprojections over all randomly generated events with regular Z are reasonble



ZPencil

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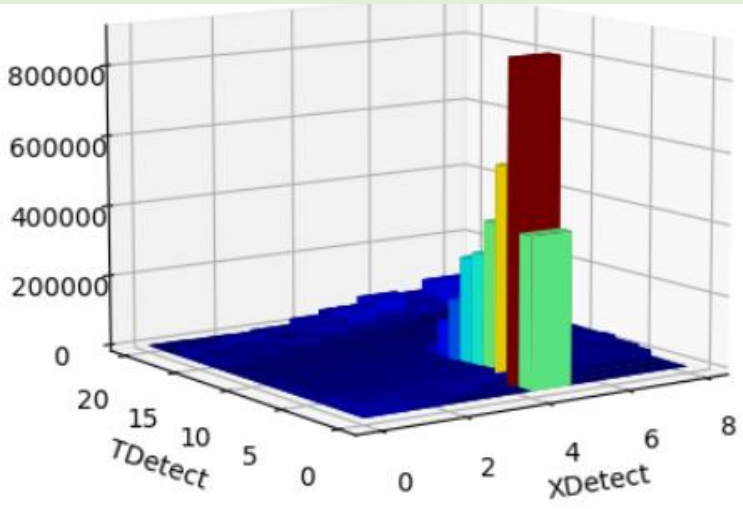
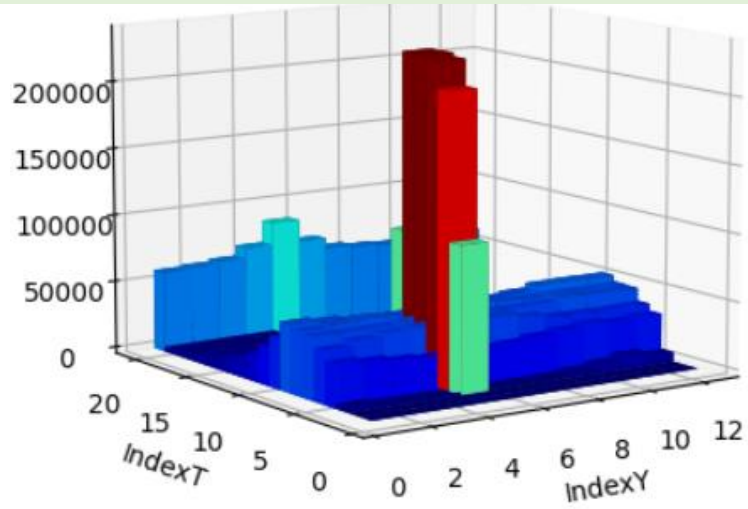
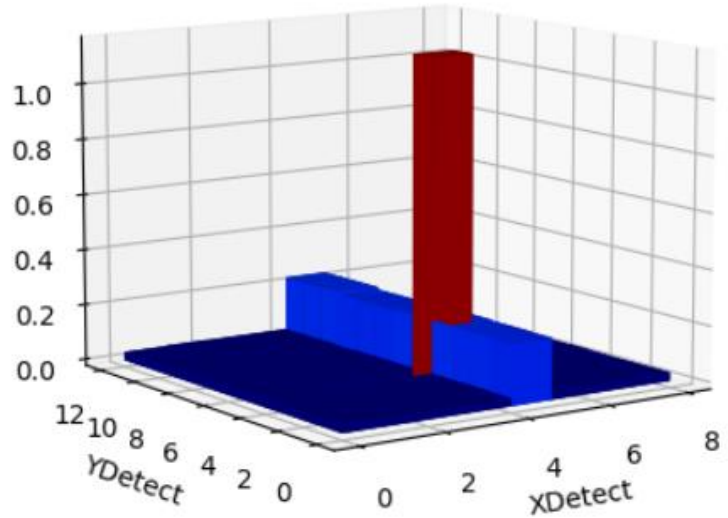
ZPencil

Integrals of projections over all random Z generated events are the same as regular Z







ZPencil

Integrals of XY,T projections over all randomly generated events are the same as regular Z