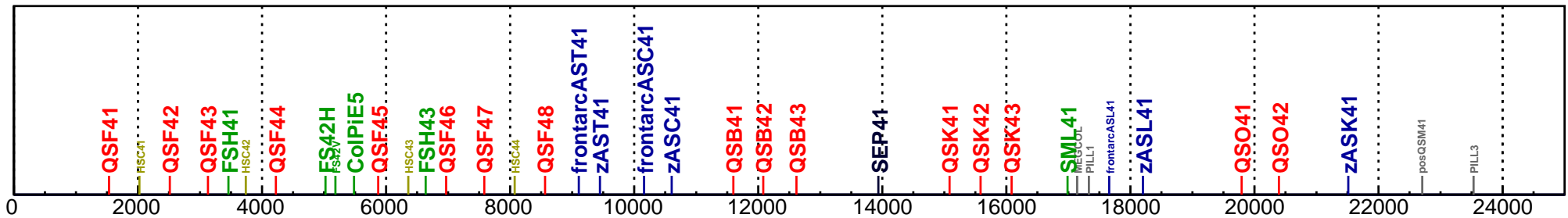


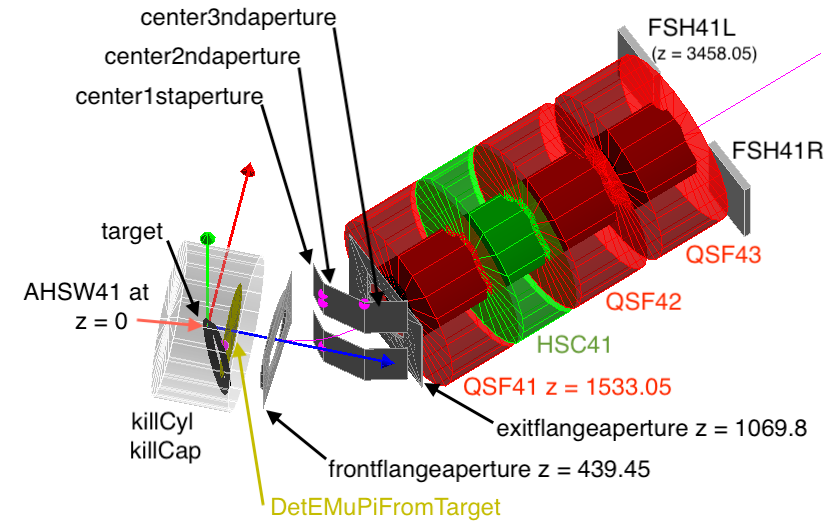
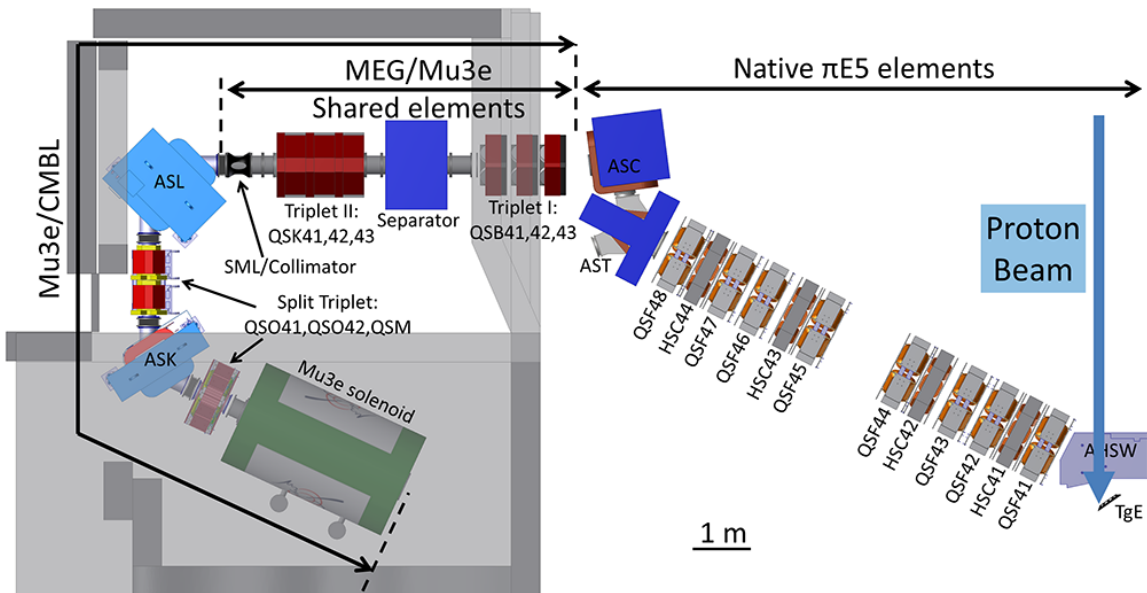
Reference plots/material

- Beamline positions (g4bl)

- ▷ AHSW (center) at $z = 0$ mm, (but) TargetCone at $z = 112.5$ mm



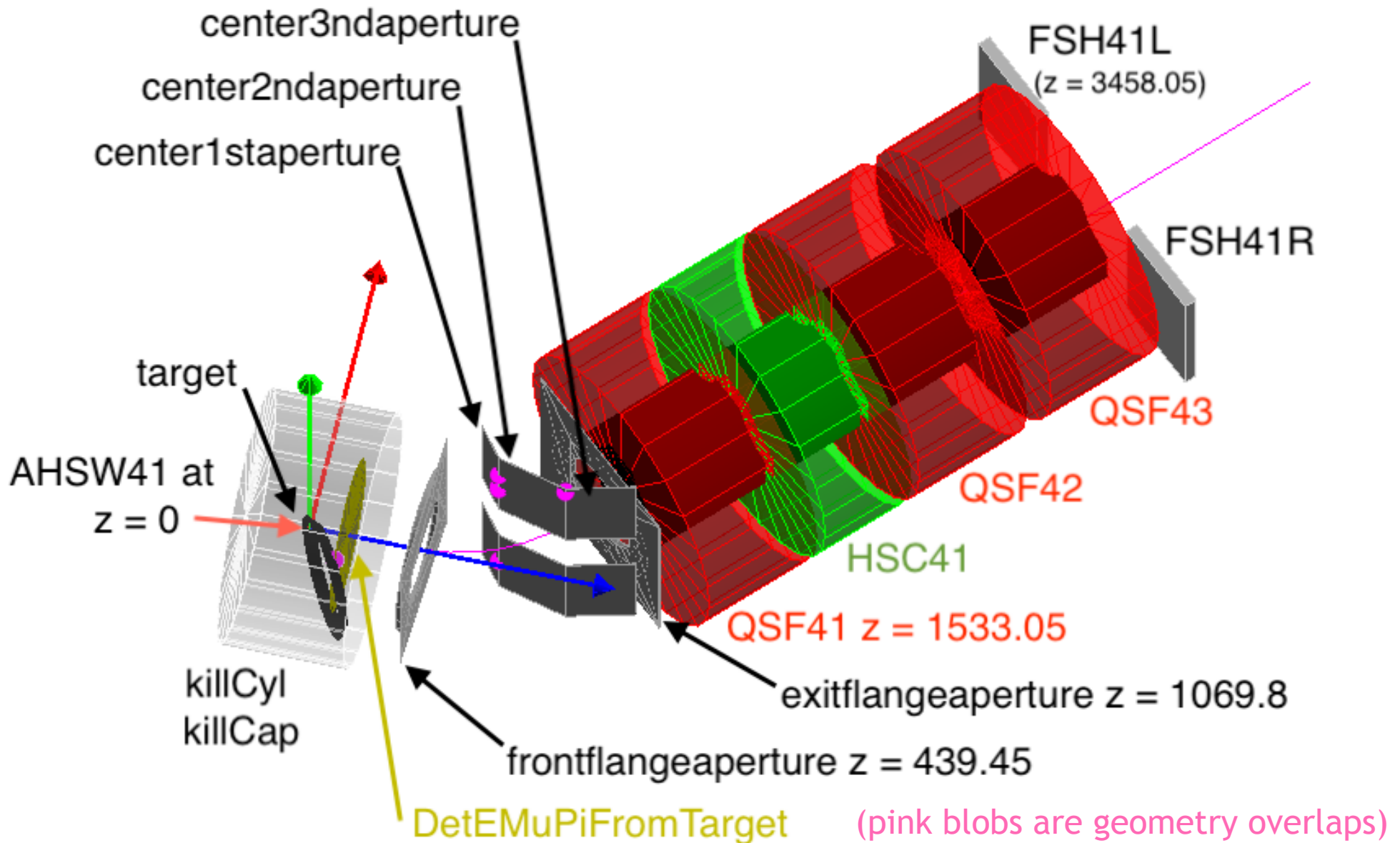
- Beamline illustrations



github repository: github.com/ursl/pioneer-g4bl

Pion production g4bl setup

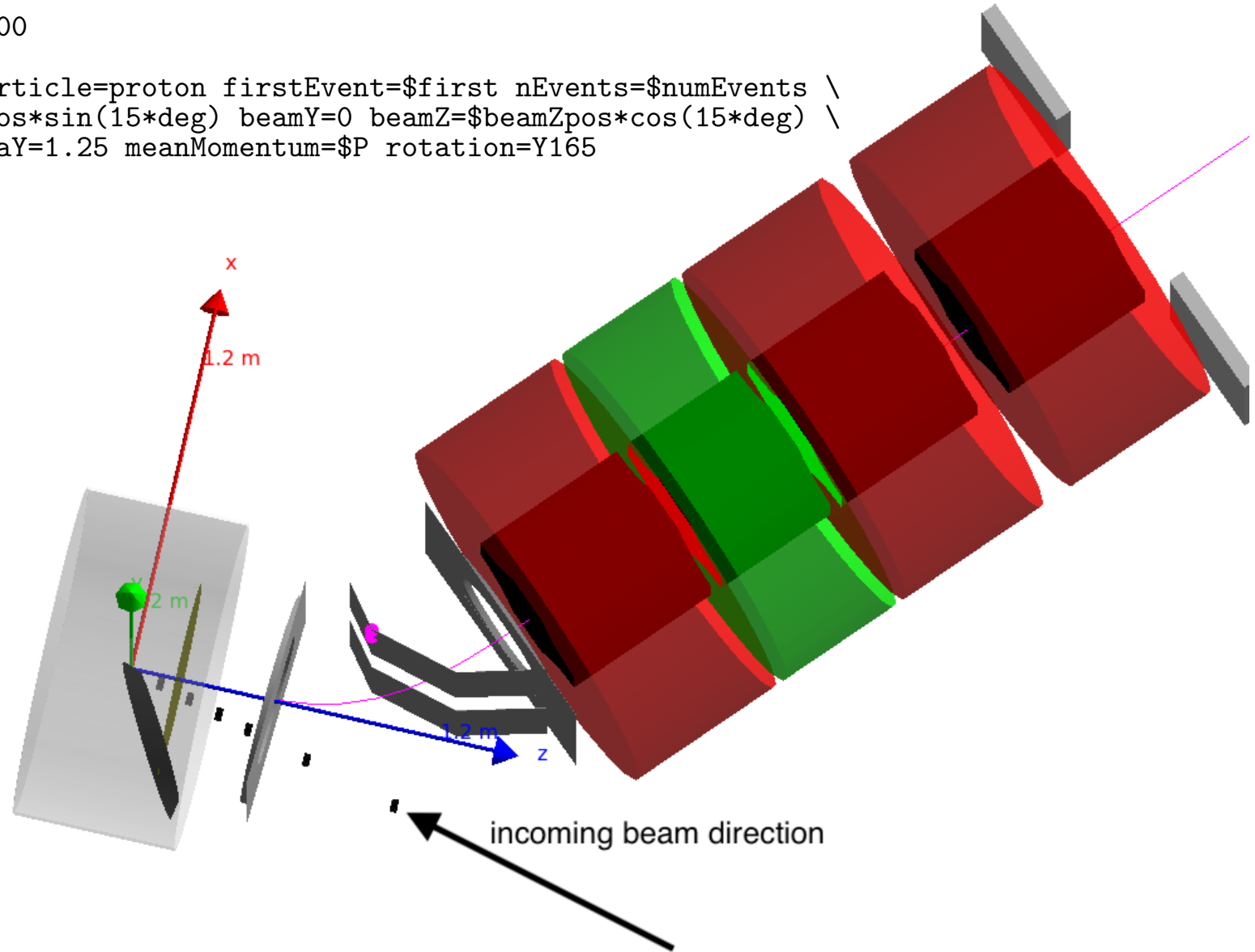
(overlap between Target and DetEMuPiFromTarget?)



Incoming beam

```
param beamZpos=100
```

```
beam gaussian particle=proton firstEvent=$first nEvents=$numEvents \  
beamX=-1*$beamZpos*sin(15*deg) beamY=0 beamZ=$beamZpos*cos(15*deg) \  
sigmaX=0.75 sigmaY=1.25 meanMomentum=$P rotation=Y165
```



AHSW41

- g4bl definitions

```
# -- Positions.txt
param -unset posAHSW41=0
param -unset posfrontarcAHSW41=440.01

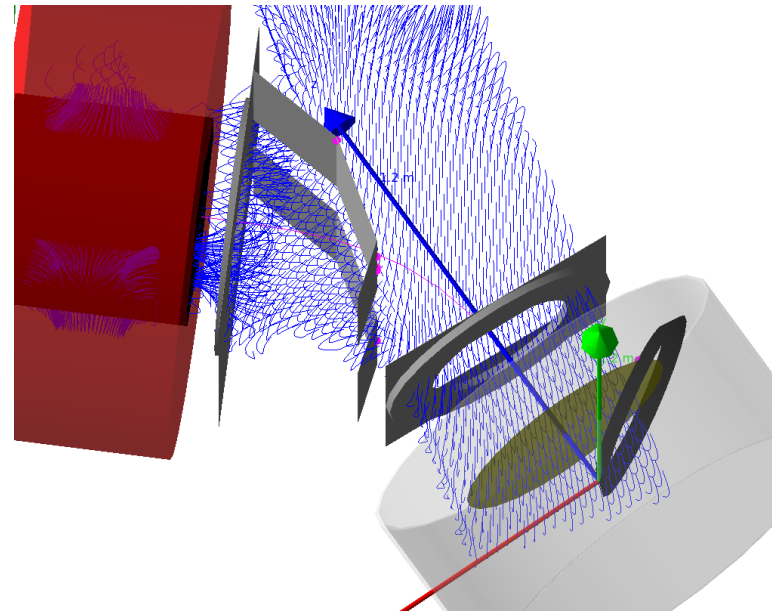
# -- g4bl card
fieldmap AHSW41 file="$G4BLPIONEER/pie5/feldahsw.dat"

# -- place flanges and other structures
# snip

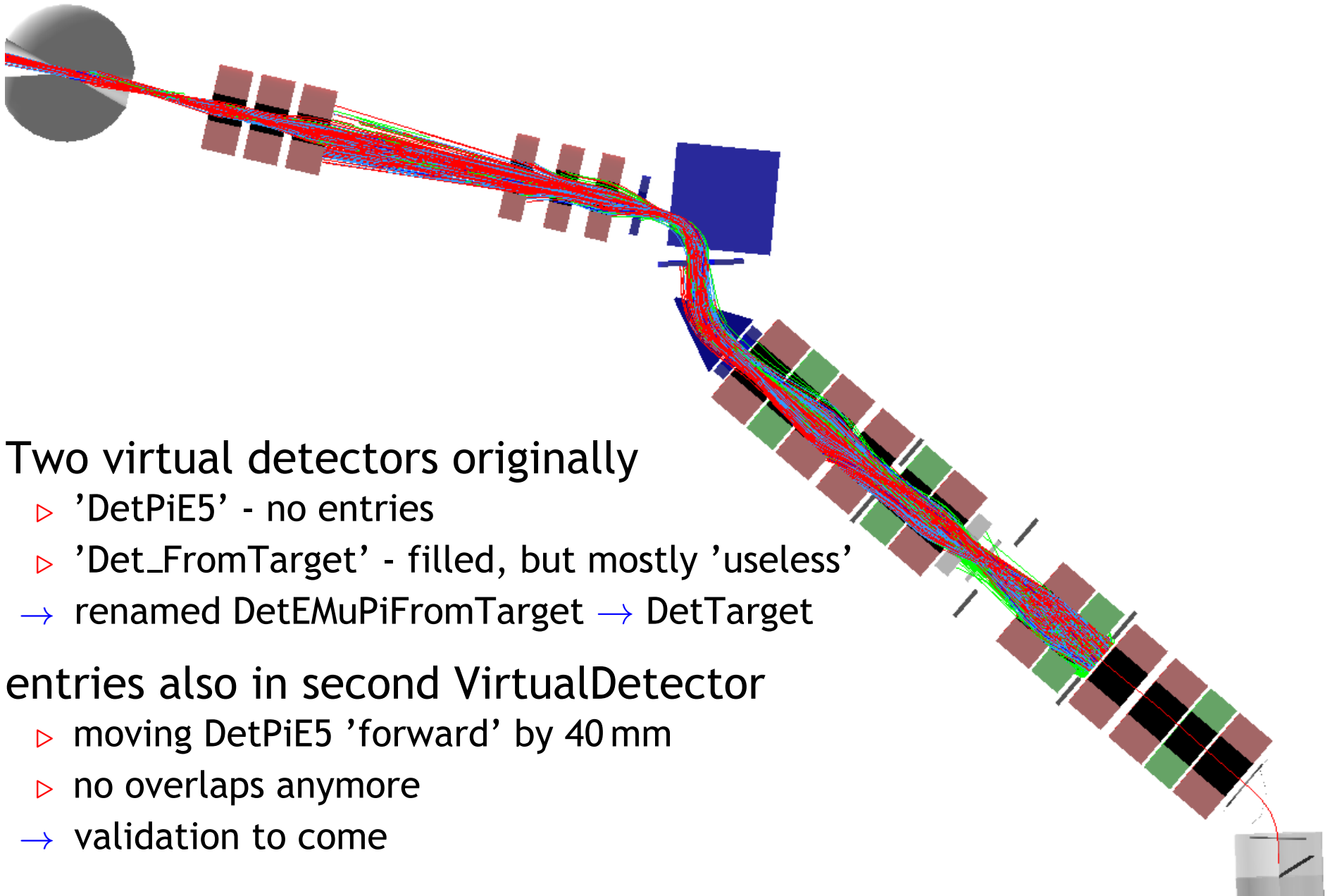
# -- place magnetic field
place AHSW41 z=$posAHSW41 x=0 rotation=Y165 current=$scaleMom*$AHSW41set
cornerarc CAHSW z=$posfrontarcAHSW41 angle=47.5 centerRadius=676.15 radiusCut=500
```

- fieldlines?

- ▶ no 'reasonable' display so far



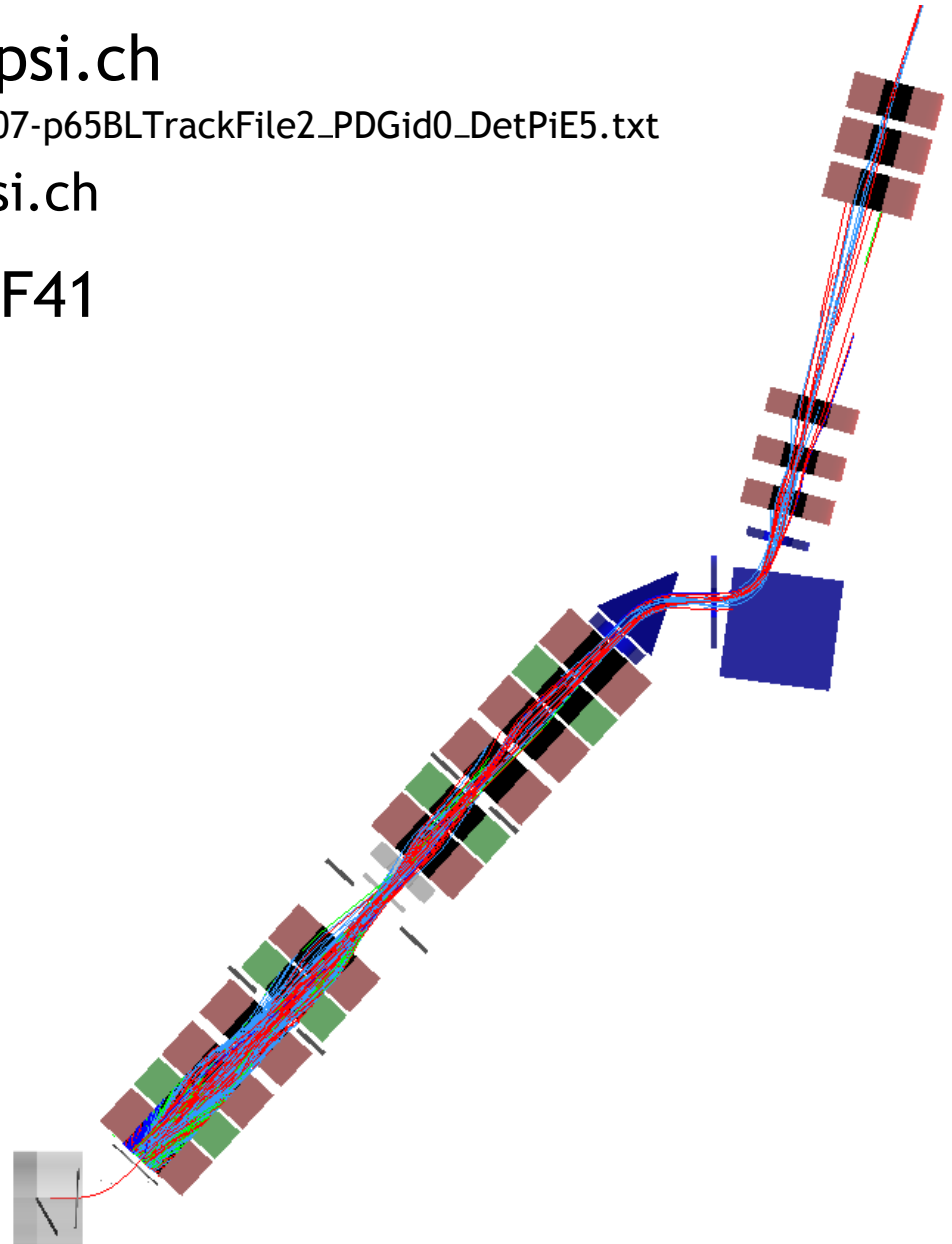
DetPiE5 VirtualDetector



- Two virtual detectors originally
 - ▷ 'DetPiE5' - no entries
 - ▷ 'Det_FromTarget' - filled, but mostly 'useless'
 - renamed DetEMuPiFromTarget → DetTarget
- entries also in second VirtualDetector
 - ▷ moving DetPiE5 'forward' by 40 mm
 - ▷ no overlaps anymore
 - validation to come

BL2 file production

- BL2 track file on merlin-l-002.psi.ch
 - ▷ /data/project/general/pioneer/g4bl/bl2/p0007-p65BLTrackFile2_PDGid0_DetPiE5.txt
 - ▷ reachable through VPN or hop.psi.ch
- VirtualDetector just before QSF41
 - ▷ so far 432254 tracks
 - ▷ production on-going



Magnet parameter definitions

- Current settings

```
place QSF rename=QSF41 z=$posQSF41 current=$scaleMom*$QSF41set
param -unset QSF41set=$corQSF41cur*$sign*$scaleQSF
param -unset scaleQSF=-1/100 # TOSCA calculation January 2018
param -unset corQSF41cur=$QSF41cur+$deltaQSF41cur
param -unset QSF41cur=-92.96
param -unset deltaQSF41cur=0
```

- ▶ input parameters distributed over a few files

- pie5/CurrentsCMBL2018.txt
- pie5/DeltaCurrents.txt
- pie5/ScaleFactors.txt

- Except that some parameters are 'fixed'

```
param AST41set=-0.38710867378611935
param ASC41set=-1.1354996108759758
param QSB41set=-6.822881
param QSB42set=11.210779
param QSB43set=-4.73587
param QSK41set=0.598725
param QSK42set=-0.931514
param QSK43set=0.613911
```

cf. [PionTransport/G4V7M_piE5_pions.i](#) (also in the original gitlab file)

Parameter evolution

- 'Fixed' parameters
 - ▷ changes up to 50% between Zach's and Giovanni's setup

"Zach"	"Giovanni"
param AST41set=-0.38710867378611935	AST41set=-0.3896
param ASC41set=-1.1354996108759758	ASC41set=-1.19
param QSB41set=-6.822881	QSB41set=-8.3444275
param QSB42set=11.210779	QSB42set=10.140709
param QSB43set=-4.73587	QSB43set=-3.184896
param QSK41set=0.598725	QSK41set=-0.60187435
param QSK42set=-0.931514	QSK42set=1.0272185
param QSK43set=0.613911	QSK43set=-0.66774813

and the rest?

- The remaining parameters are identical

"Zach"	"Giovanni"	Remarks
AHSW41set=-0.27083334	AHSW41set=-0.27083334	
ASC41set=-1.1354996	ASC41set=-1.19	5% previous slide
ASK41set=1.8062	ASK41set=1.8062	
ASL41set=1.6272109	ASL41set=1.6272109	
AST41set=-0.38710867	AST41set=-0.3896	previous slide
FS42Lset=300	FS42Lset=300	
FS42Rset=380	FS42Rset=380	
FS42Vset=360	FS42Vset=360	
FSH41Lset=300	FSH41Lset=300	
FSH41Rset=300	FSH41Rset=300	
FSH43Lset=240	FSH43Lset=240	
FSH43Rset=220	FSH43Rset=220	
HSC41set=-31.866667	HSC41set=-31.866667	
HSC42set=0	HSC42set=49.816668	broken in 2022
HSC43set=75.100002	HSC43set=75.100002	
HSC44set=-16.316667	HSC44set=-16.316667	
QSB41set=-6.822881	QSB41set=-8.3444275	20% previous slide
QSB42set=11.210779	QSB42set=10.140709	10% previous slide
QSB43set=-4.73587	QSB43set=-3.184896	50% previous slide
QSF41set=0.9296	QSF41set=0.9296	
QSF42set=-0.8322	QSF42set=-0.8322	
QSF43set=0.6499	QSF43set=0.6499	
QSF44set=-0.8195	QSF44set=-0.8195	
QSF45set=-0.8602	QSF45set=-0.8602	
QSF46set=0.816	QSF46set=0.816	
QSF47set=-0.9458	QSF47set=-0.9458	
QSF48set=0.515	QSF48set=0.515	
QSK41set=0.598725	QSK41set=-0.60187435	previous slide
QSK42set=-0.931514	QSK42set=1.0272185	10% previous slide
QSK43set=0.613911	QSK43set=-0.66774813	10% previous slide
QSM41set=-0.63557143	QSM41set=-0.63557143	
QS041set=-0.10156	QS041set=-0.10156	
QS042set=0.027	QS042set=0.027	
SEP41_B_set=44.02	SEP41_B_set=44.02	
SEP41_E_set=195	SEP41_E_set=195	
SML41set=-0.0026667991	SML41set=-0.0026667991	

QSK41 scan

- Run 113 is a QSK41 scan ("QSK triplet scan 5x5")
 - ▷ AHSW epics current same as for run 100 ("65MeV/c tune")
 - ▷ json current: 34.2, . . . , 41.8
 - ▷ CurrentsCMBL (for 28 MeV): param -unset QSK41cur=24.07
 - ▷ for 65 MeV: param -unset QSK41cur=55.88

⇒ That's what I am doing next