

New SoLID Setup

1

- Detector Layout
- Magnet dimension
- EC size
- Cables

➤ Zhiwen Zhao

- ❑ 2017/02/22
- ❑ 2017/04/10

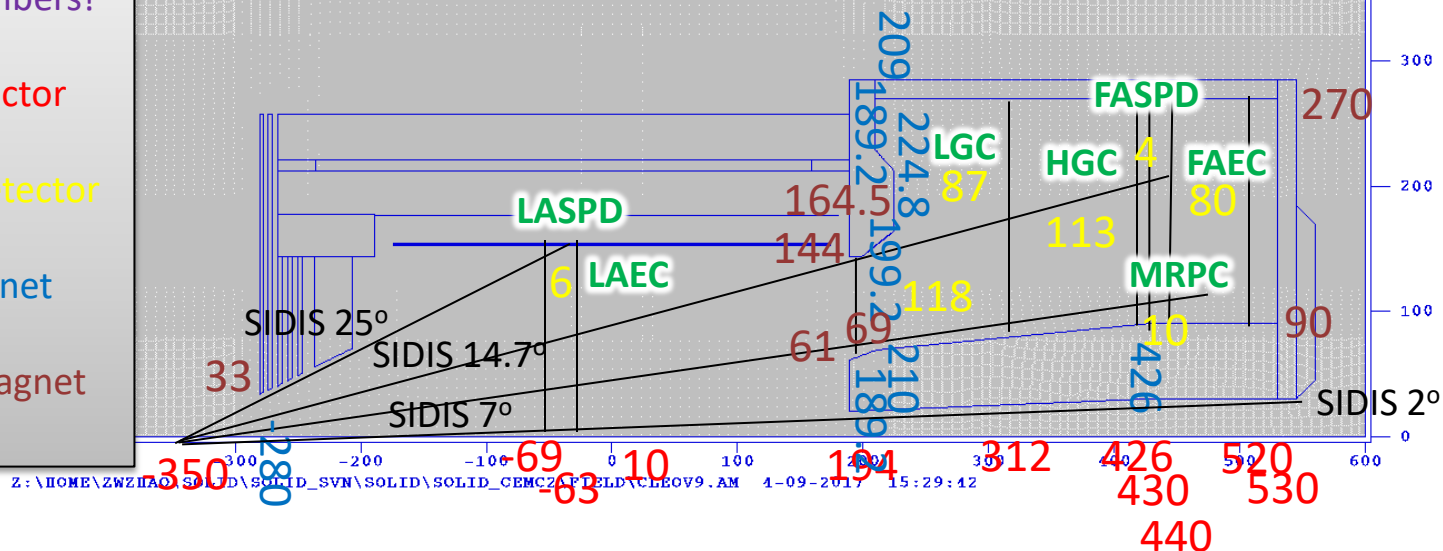
Proposed Layout and Magnet

enlarge endcap space in Z by 45cm=(530-485)
Change endcap nose with two slopes

SIDIS and JPsi

Read the Color numbers!

- Red number, detector boundary in Z
- Yellow number, detector space in Z
- Blue number, magnet boundary in Z
- Brown number, magnet boundary in R



144cm	Cryo Rin
R=144cm , Z=199.2	Collar tip1
R=164.5cm , Z=224.8	Collar tip2
$\text{atan}((164.5-144)/(224.8-199.2))/3.1416*180=38.7^\circ$	Collar slope
R=61cm , Z=189.2	Endcap Nose tip1
R=69cm , Z=210	Endcap Nose tip2
R=90cm , Z=426	Endcap Nose flat
$\text{atan}((69-61)/(210-189.2))/3.1416*180=21.0^\circ$	Endcap nose slope1
$\text{atan}((90-69)/(426-210))/3.1416*180=5.6^\circ$	Endcap nose slope2
$(350-280)*\tan(25/180*3.1416) =33\text{cm}$	front plug Rin

$\text{atan}(135/(350-63))/3.1416*180=25.2^\circ$	SIDIS Max angle
$\text{atan}(144/(350+199.2))/3.1416*180=14.7^\circ$	SIDIS Middle angle, collar tip1
$\text{atan}(69/(350+210))/3.1416*180=7^\circ$	SIDIS Min angle, nose tip2
$\text{atan}(95/(350+426))/3.1416*180=7^\circ$	SIDIS Min angle, nose flat
$\text{atan}(135/(315-63))/3.1416*180=28.2^\circ$	JPsi Max angle
$\text{atan}(144/(315+199.2))/3.1416*180=15.7^\circ$	JPsi Middle angle, collar tip1
$\text{atan}(69/(315+210))/3.1416*180=7.5^\circ$	JPsi Min angle, nose tip2
$\text{atan}(95/(315+426))/3.1416*180=7.3^\circ$	JPsi Min angle, nose flat

Proposed Layout and Magnet

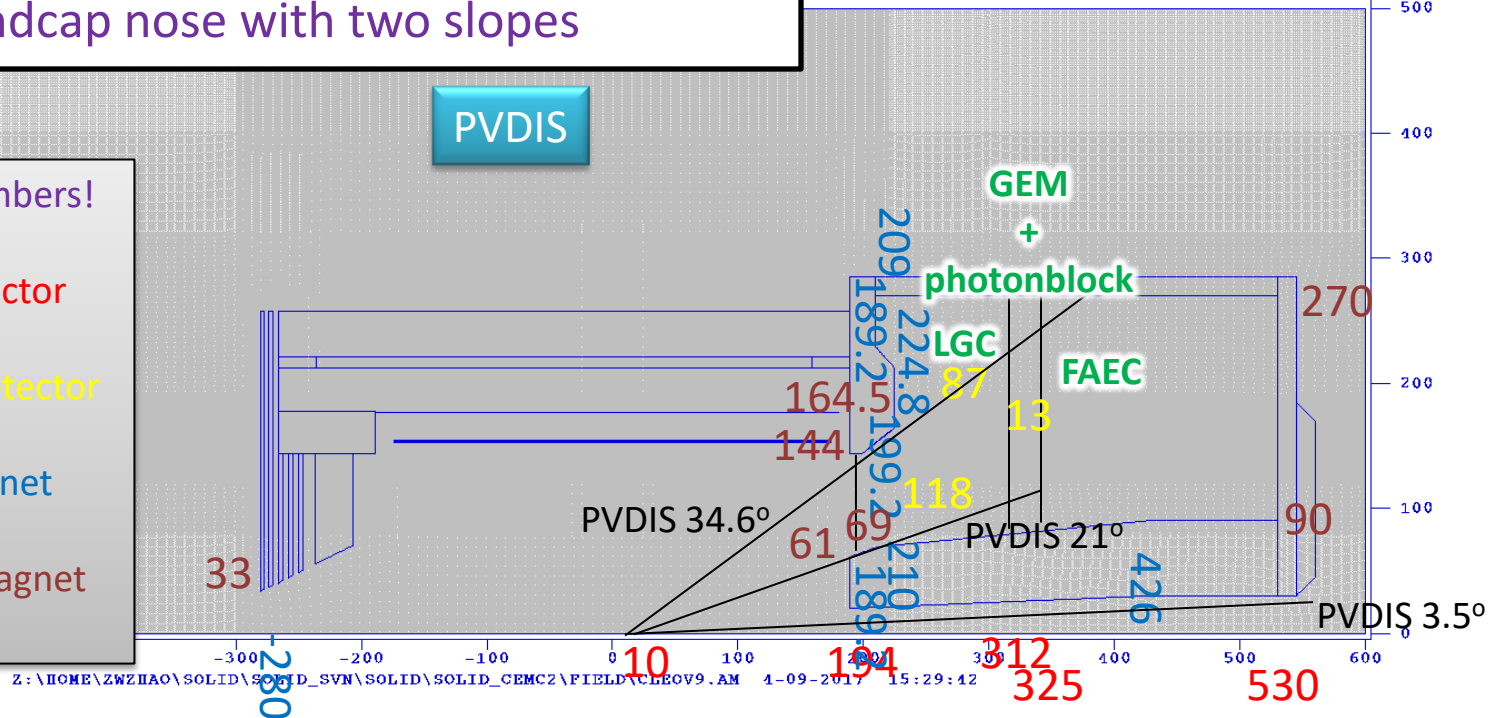
3

enlarge endcap space in Z by 45cm=(530-485)
Change endcap nose with two slopes

PVDIS

Read the Color numbers!

- Red number, detector boundary in Z
- Yellow number, detector space in Z
- Blue number, magnet boundary in Z
- Brown number, magnet boundary in R



144cm	Cryo Rin
$R=144\text{cm}, Z=199.2$	Collar tip1
$R=164.5\text{cm}, Z=224.8$	Collar tip2
$\text{atan}((164.5-144)/(224.8-199.2))/3.1416*180=38.7^\circ$	Collar slope
$R=61\text{cm}, Z=189.2$	Endcap Nose tip1
$R=69\text{cm}, Z=210$	Endcap Nose tip2
$R=90\text{cm}, Z=426$	Endcap Nose flat
$\text{atan}((69-61)/(210-189.2))/3.1416*180=21.0^\circ$	Endcap nose slope1
$\text{atan}((90-69)/(426-210))/3.1416*180=5.6^\circ$	Endcap nose slope2
$(350-280)*\text{tan}(25/180*3.1416) = 33\text{cm}$	front plug Rin

$\text{atan}(144/(199.2-10+20))/3.1416*180 = 34.6^\circ$	PVDIS Max angle, up, collar tip1
$\text{atan}(144/(199.2-10))/3.1416*180 = 37.3^\circ$	PVDIS Max angle, middle, collar tip1
$\text{atan}(144/(199.2-10-20))/3.1416*180 = 40.4^\circ$	PVDIS Max angle, down, collar tip1
$\text{atan}(164.5/(224.8-10+20))/3.1416*180 = 35.0^\circ$	PVDIS Max angle, up, collar tip2
$\text{atan}(164.5/(224.8-10))/3.1416*180 = 37.4^\circ$	PVDIS Max angle, middle, collar tip2
$\text{atan}(164.5/(224.8-10-20))/3.1416*180 = 40.2^\circ$	PVDIS Max angle, down, collar tip2
$\text{atan}(61/(189.2-10+20))/3.1416*180 = 17.0^\circ$	PVDIS Min angle, up, nose tip1
$\text{atan}(61/(189.2-10))/3.1416*180 = 18.8^\circ$	PVDIS Min angle, middle, nose tip1
$\text{atan}(61/(189.2-10-20))/3.1416*180 = 21.0^\circ$	PVDIS Min angle, down, nose tip1
$\text{atan}(69/(210-10+20))/3.1416*180 = 17.4^\circ$	PVDIS Min angle, up, nose tip2
$\text{atan}(69/(210-10))/3.1416*180 = 19.0^\circ$	PVDIS Min angle, middle, nose tip2
$\text{atan}(69/(210-10-20))/3.1416*180 = 21.0^\circ$	PVDIS Min angle, down, nose tip2

Proposed EC Size

Assume EC module 50cm long

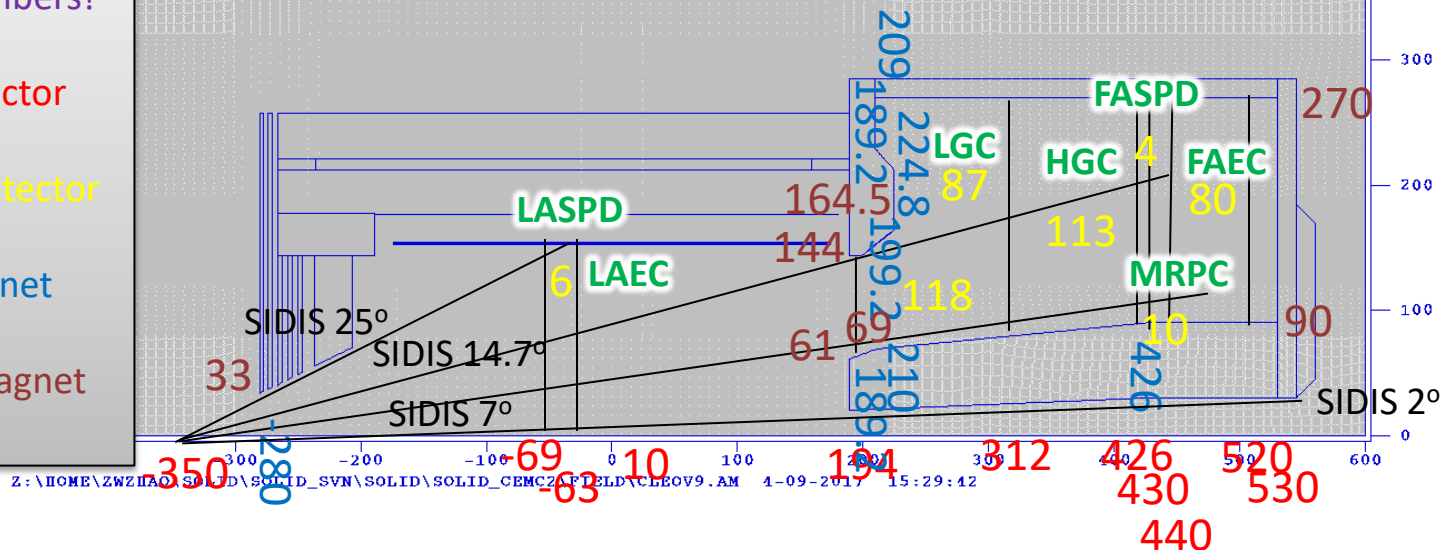
4

enlarge endcap space in Z by 45cm=(530-485)
Change endcap nose with two slopes

SIDIS and JPsi

Read the Color numbers!

- Red number, detector boundary in Z
- Yellow number, detector space in Z
- Blue number, magnet boundary in Z
- Brown number, magnet boundary in R



$$(350+440) \cdot \tan(7/180 \cdot 3.1416) = 97\text{cm} \quad \text{FAEC SIDIS Rin(phys)}$$

$$97 - 7 = 90\text{cm} \quad \text{FAEC SIDIS Rin(eng)}$$

$$(315+490) \cdot \tan(15.7/180 \cdot 3.1416) = 226\text{cm} \quad \text{FAEC JPsi Rout(phy)}$$

$$226 + 14 = 240\text{cm} \quad \text{FAEC JPsi Rout(eng)}$$

$$3.1416 \cdot (240 \cdot 240 - 90 \cdot 90) / 1e4 = 15.6 \text{ m}^2 \quad \text{area FAEC SIDIS}$$

$$(350-63) \cdot \tan(14.7/180 \cdot 3.1416) = 76\text{cm} \quad \text{LAEC SIDIS front Rin(eng)}$$

$$(350-13) \cdot \tan(14.7/180 \cdot 3.1416) = 88\text{cm} \quad \text{LAEC SIDIS rear Rin(eng)}$$

$$144\text{cm} \quad \text{LAEC Rout (eng)}$$

$$(350-63) \cdot \tan(25/180 \cdot 3.1416) = 134\text{cm} \quad \text{LAEC SIDIS front Rout (phy)}$$

$$(350-38) \cdot \tan(25/180 \cdot 3.1416) = 146\text{cm} \quad \text{LAEC SIDIS middle Rout (phy)}$$

$$(350-13) \cdot \tan(25/180 \cdot 3.1416) = 157\text{cm} \quad \text{LAEC SIDIS rear Rout (phy)}$$

$$3.1416 \cdot (144 \cdot 144 - 76 \cdot 76) / 1e4 = 4.7 \text{ m}^2 \quad \text{area LAEC SIDIS}$$

Proposed EC Size

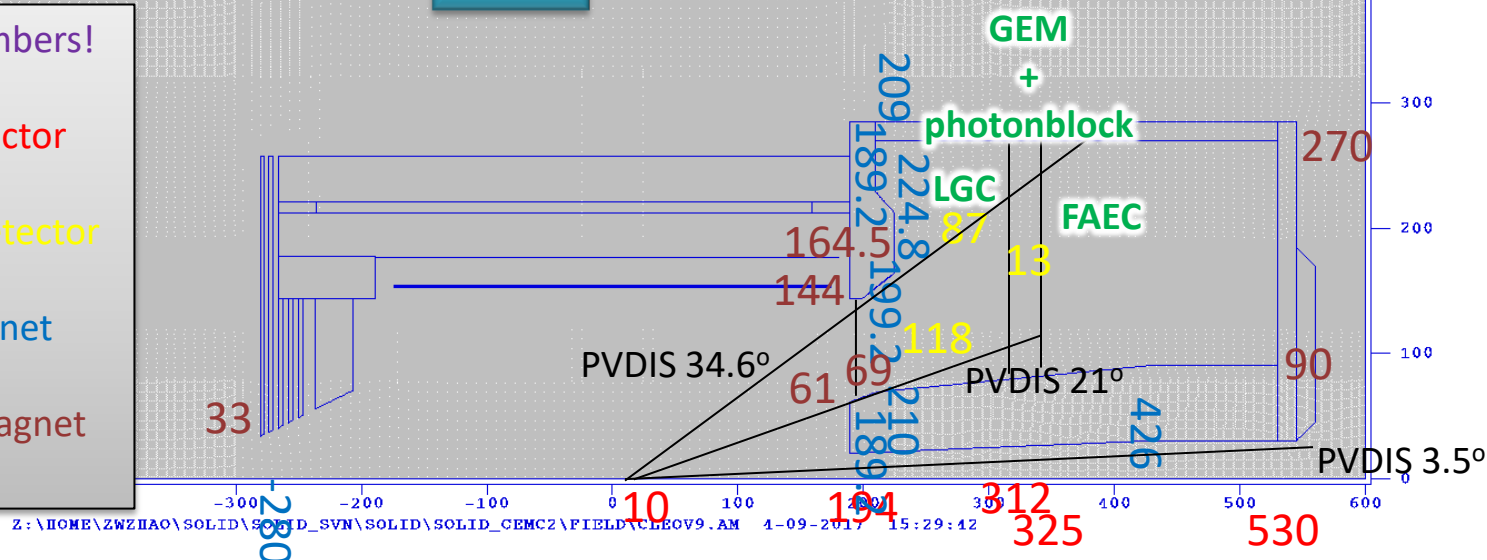
Assume EC module 50cm long

enlarge endcap space in Z by 45cm=(530-485)
Change endcap nose with two slopes

PVDIS

Read the Color numbers!

- Red number, detector boundary in Z
- Yellow number, detector space in Z
- Blue number, magnet boundary in Z
- Brown number, magnet boundary in R



(325-10-20)*tan(21/180*3.1416) = 113cm FAEC PVDIS Rin from up (phys)
90cm FAEC PVDIS Rin from up (eng)
(375-10+20)*tan(35/180*3.1416) = 270cm FAEC PVDIS Rout(phy)
270cm FAEC PVDIS Rout(eng)

$$3.1416 \cdot (270^2 - 90^2) / 10^4 = 20.4 \text{ m}^2 \quad \text{area FAEC PVDIS}$$

Cables

6

	Total area(cm2)	Location to go out	comment
FAEC (PVDIS)	1800	Endcap Back plate	1800 1.1cmD fiber bundle, 1800 0.3cmD fiber bundle
LAEC (SIDIS)	500	near downstream collar?	500 1.1cmD fiber bundle, 500 0.3cmD fiber bundle
LASPD	2?	near downstream collar or solenoid front?	60 HV, 60 BNC
LGC	30 * 5?	Near downstream collar or endcap side?	270 5mmD HV, 270 3mmD BNC
HGC	30 * 10	Endcap side	480 HV, 480 BNC 2 gas line at top, 2 gas line at bottom
GEM (PVDIS)		Near downstream collar or endcap side?	
GEM (SIDIS)		Near downstream collar or solenoid front?	
MRPC		endcap side	