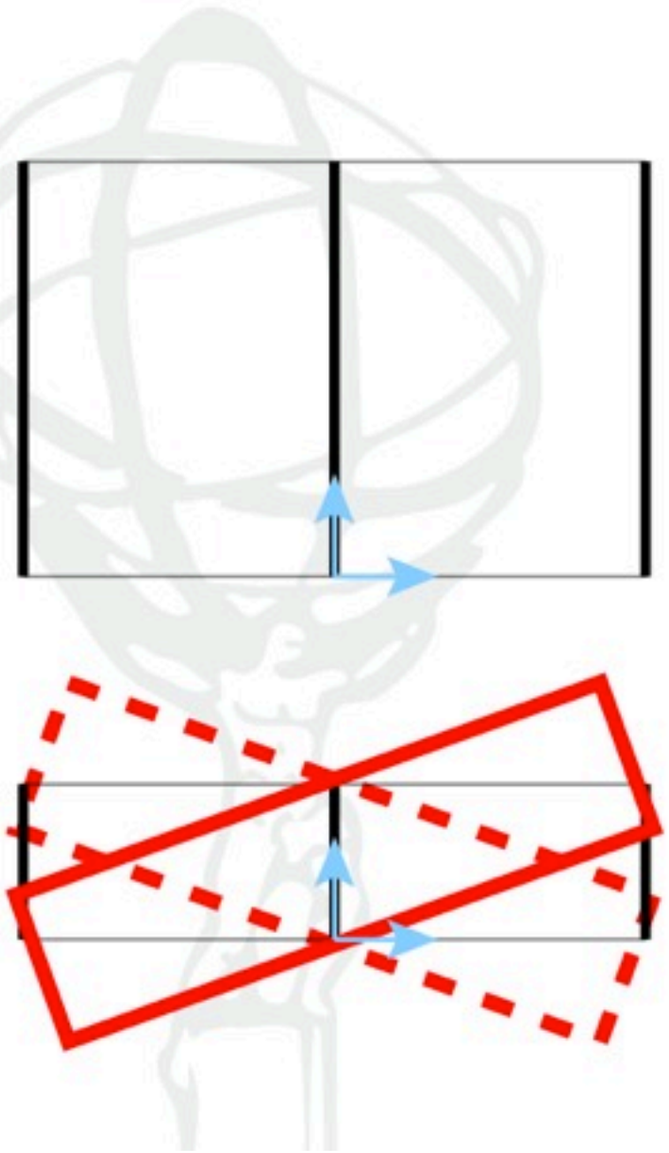
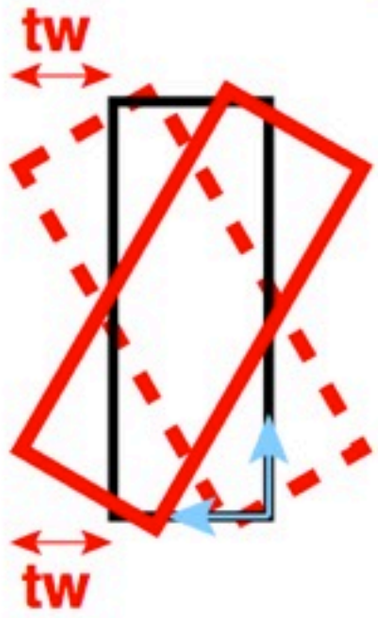
twist parameter
implementation in MGM vs general conventions
s spagnolo

twist

Twist: tw (1 Parameter)





- **tw:**

  out-of-plane rotation of both outer cross-plates in opposite directions, tubes remain straight

  maximum out-of-plane shift (at corners) equals tw, positive for shift of corner at $s_{\mathrm{rel}} = 1, z_{\mathrm{rel}} = 1$ towards negative t

unit: mm

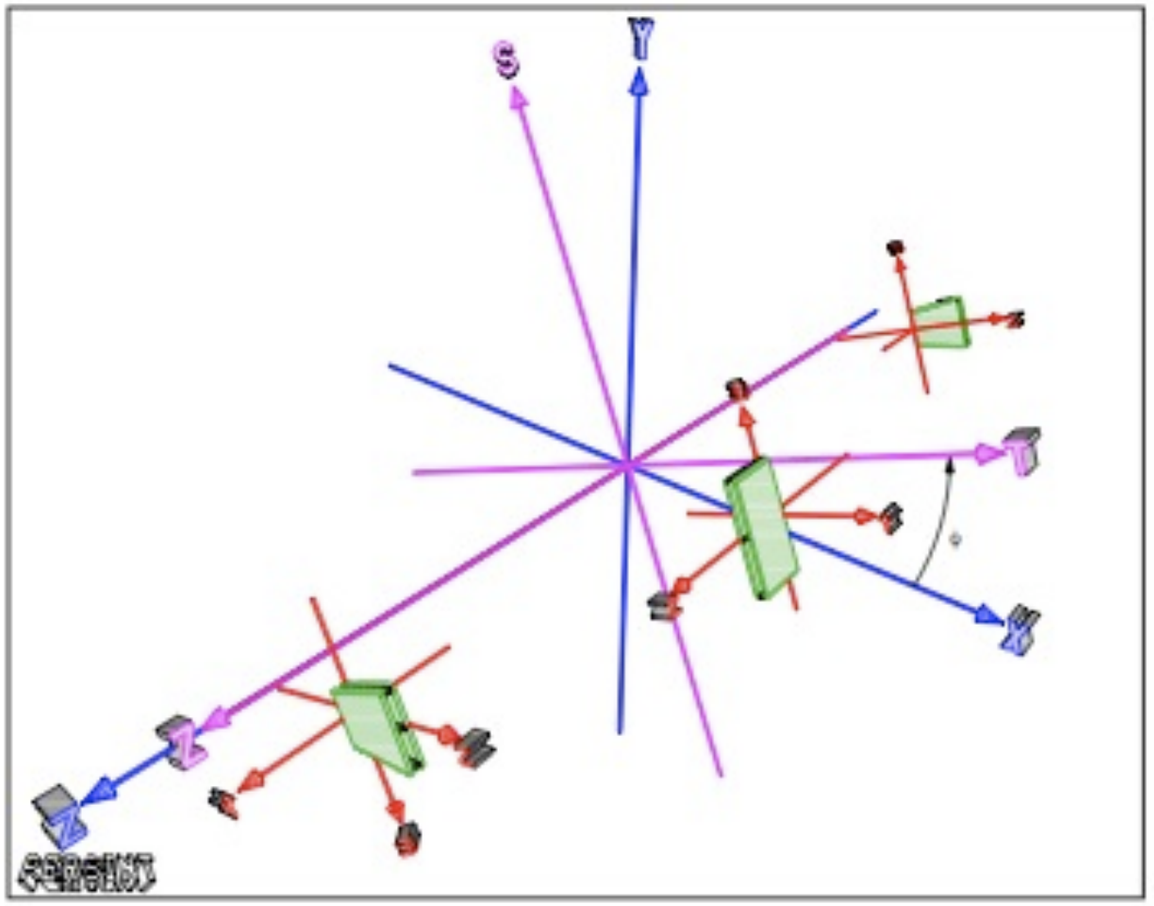
typical: $\mathcal{O}(100\,\mu\mathrm{m})$

formula:

$$\phi = -\mathrm{tw} \cdot s_{\mathrm{rel}}$$

transformation:

$$s \rightarrow s$$
$$t \rightarrow t + \phi \cdot z_{\mathrm{rel}}$$
$$z \rightarrow z - \phi \cdot t_{\mathrm{rel}} \cdot \frac{\mathrm{height}}{\mathrm{length}}$$

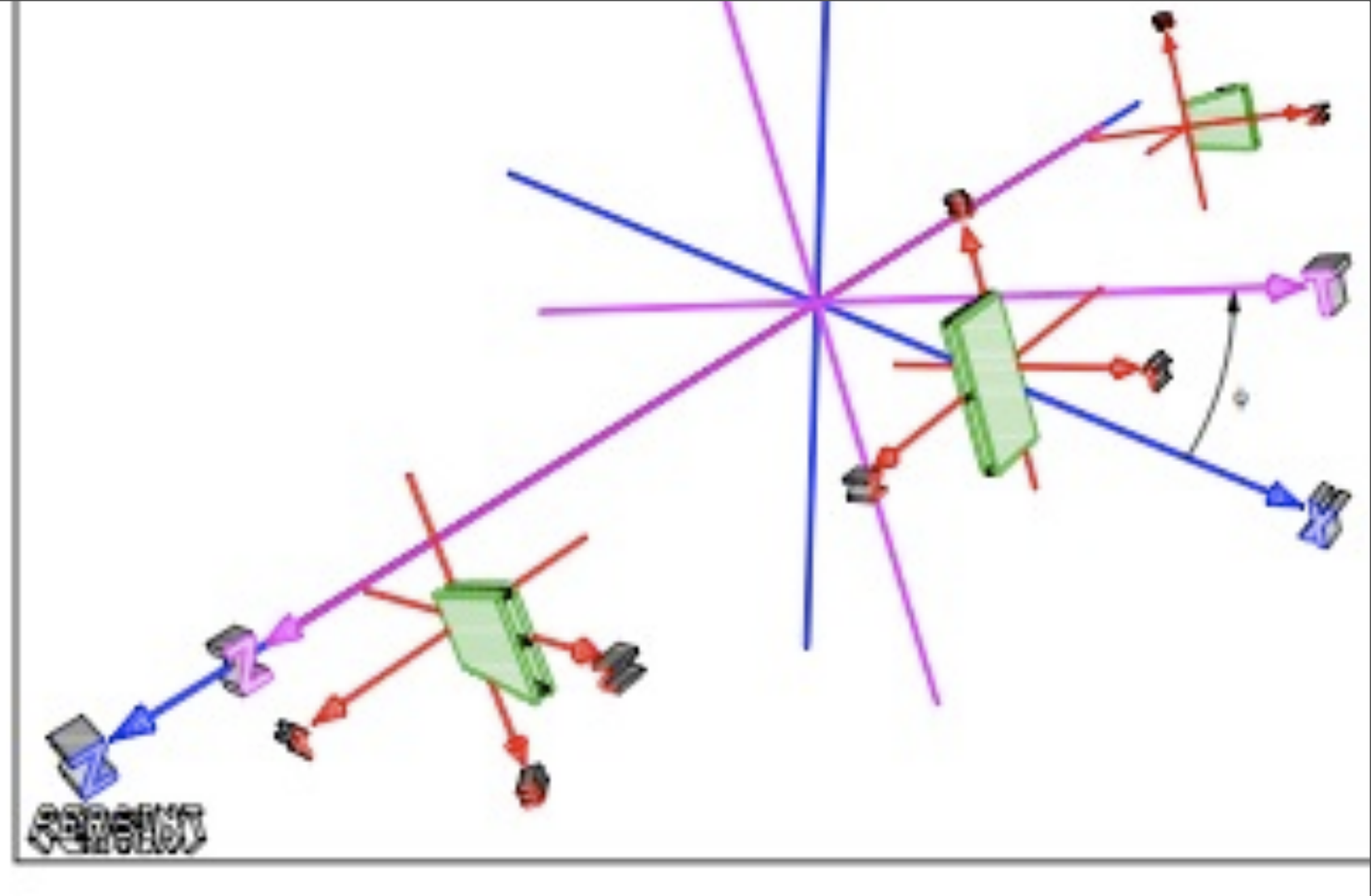

S
Y

Check implementation

- Concentrate on BOL and EML in sector 5 (stationPhi=3) and StationEta=+-1 (to check both C and A side)
  - Barrel, sector 5, side A ➛ amdb local **szt** frame is equal (but translated) to **-x,z,y** (global ATLAS frame)
  - Barrel, sector 5, side C ➛ amdb local **szt** frame is equal (but translated) to **-x,z,y** (global ATLAS frame) [equal to side A]
  - End-cap, sector 5, side A ➛ amdb local **szt** frame is equal (but translated) to **x,y,z** (global ATLAS frame)
  - End-cap, sector 5, side C ➛ amdb local **szt** frame is equal (but translated) to **-x,y,-z** (global ATLAS frame)
- baseline layout: ATLAS-GEO-10-00-01, conditions

BOL- side A bottom

- Barrel, sector 5, side A
- ➛ amdb local **szt** frame is equal
- (but translated)
- to **-x,z,y** (global ATLAS frame)



1st tube, 1st tube layer, 1st multi layer, RO side (@s+): s_rel=1,z_rel=-1,t_rel=-1;
φ=-20, dY=dt=φz_rel=20mm dZ=dz=-φt_rel*h/l=-4mm expected

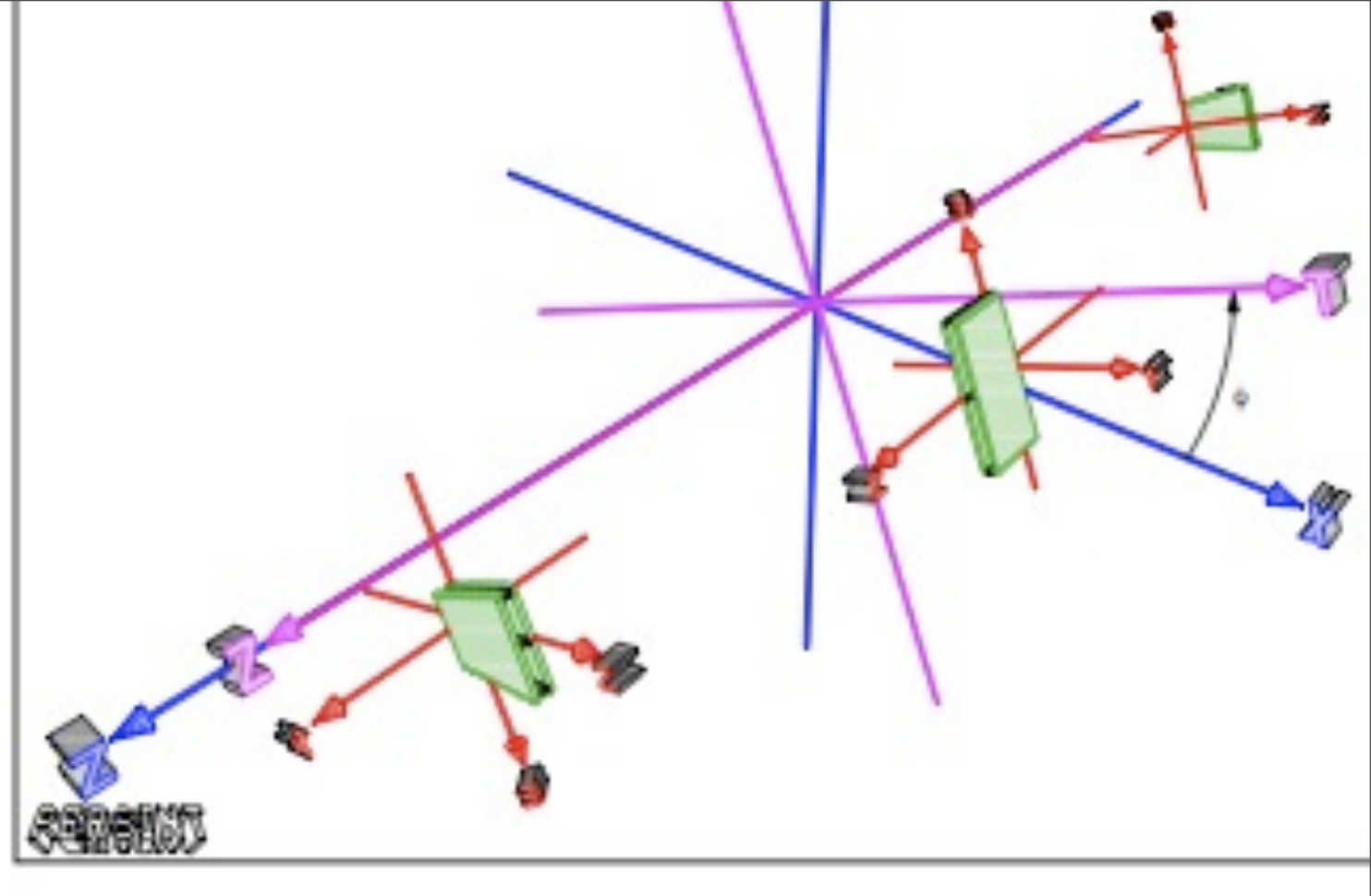
nominal x,y,z = -2453.7500 9274.4567 405.0170
corrected x,y,z = -2453.6684 9293.9317 400.4109 dy = 20 mm, dz = -4mm OK

last tube, 1st tube layer, 1st multi layer, RO side (@s+): s_rel=1,z_rel=1,t_rel=-1;
φ=-20, dY=dt=φz_rel=-20mm dZ=dz=-φt_rel*h/l=-4.mm expected

nominal x,y,z = -2453.7500 9274.4567 2297.2220
corrected x,y,z =-2453.6708 9255.2884 2292.6159 dy = -20 mm, dz = -4mm OK

BOL- side A top

- Barrel, sector 5, side A
- ➛ amdb local **szt** frame is equal
- (but translated)
- to **-x,z,y** (global ATLAS frame)



1st tube, last tube layer, last multi layer, RO side (@s+): s_rel=1,z_rel=-1,t_rel=1;
φ=-20, dY=dt=φz_rel=20mm dZ=dz=-φt_rel*h/l=4mm expected

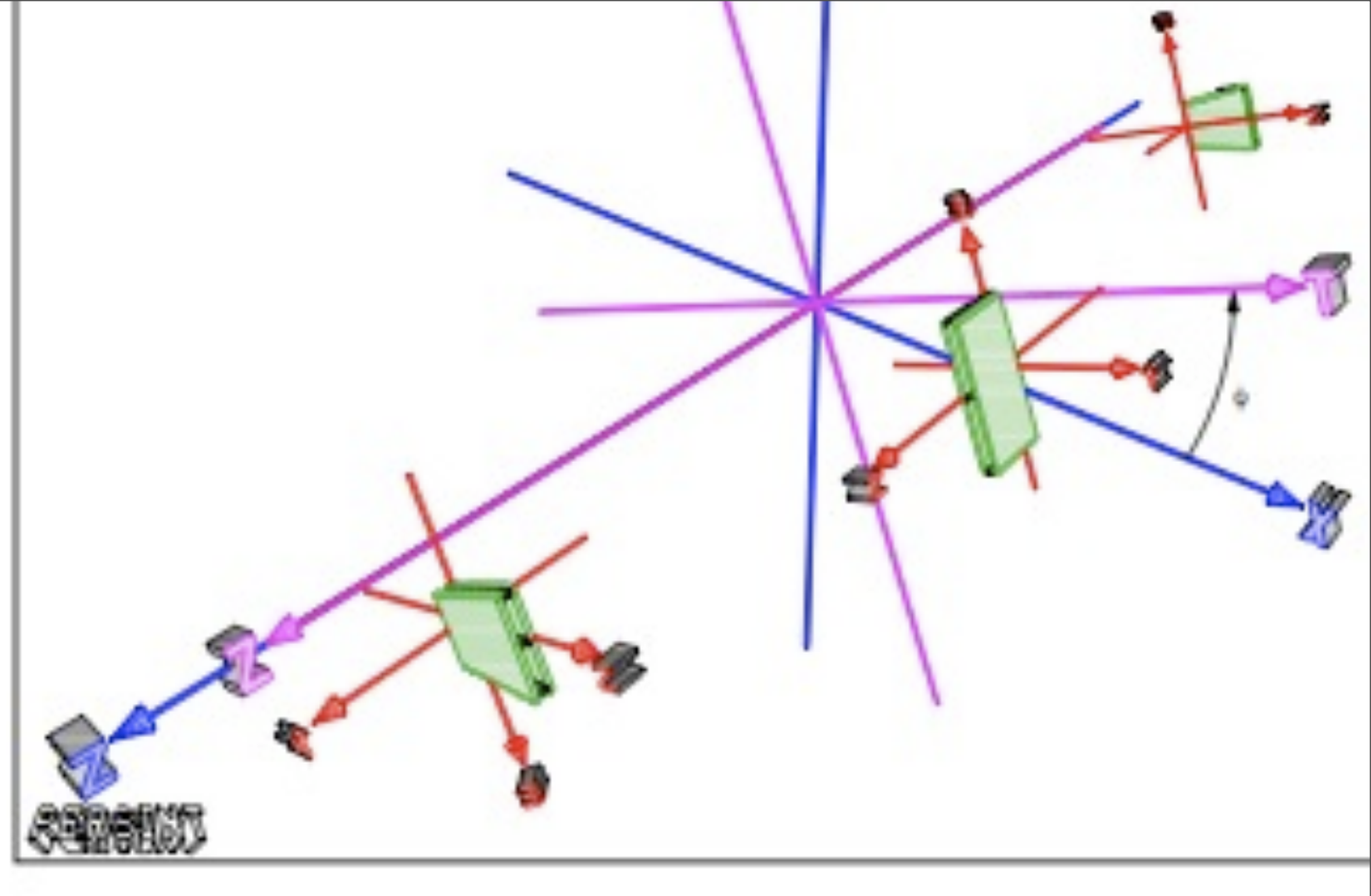
nominal x,y,z -2453.7500 9725.5397 405.0170
corrected x,y,z=-2453.6684 9745.0147 409.6231 dy = 20 mm, dz = 4mm OK

last tube, last tube layer, last multi layer, RO side (@s+): s_rel=1,z_rel=1,t_rel=1;
φ=-20, dY=dt=φz_rel=-20mm dZ=dz=-φt_rel*h/l=4.mm expected

nominal x,y,z = -2453.7500 9725.5397 2297.2220
corrected x,y,z =-2453.6708 9706.3714 2301.8281 dy = -20 mm, dz = 4mm OK

EML- side A internal side

- Endcap, sector 5, side A
- ➛ amdb local **szt** frame is oriented like x,y,z global



1st tube, 1st tube layer, 1st multi layer, RO side (@s-): s_rel=-1,z_rel=-1,t_rel=-1;
φ=20, dZ=dt=φz_rel=-20mm dY=dz=-φt_rel*h/l=3mm expected

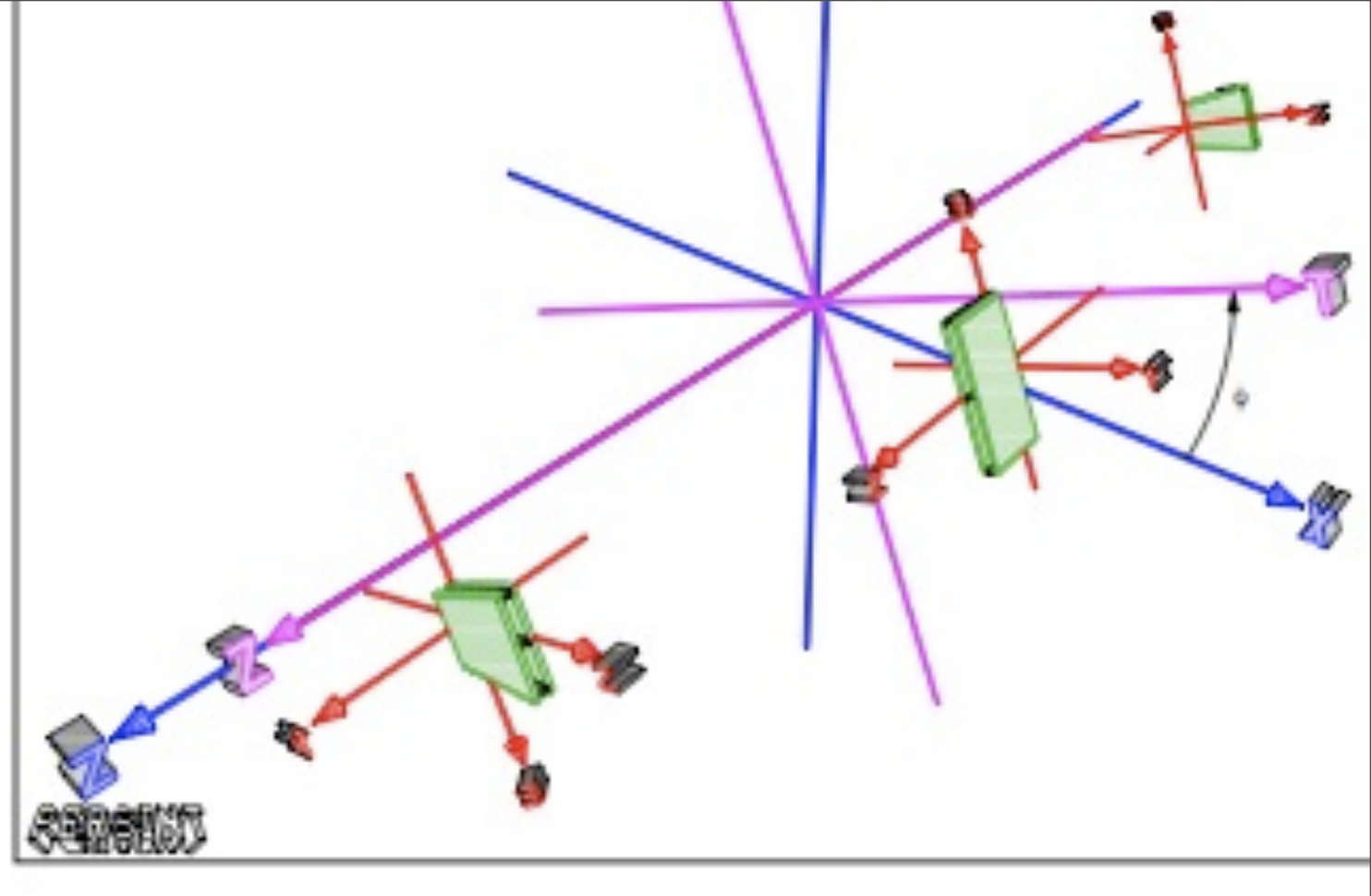
nominal x,y,z =-566.2500 1785.0170 14142.4975
corrected x,y,z =-565.9335 1788.4143 14123.8738 dz=-20 mm, dy = 3mm OK

last tube, 1st tube layer, 1st multi layer, RO side (@s-): s_rel=-1,z_rel=1,t_rel=-1;
φ=20, dZ=dt=φz_rel=20mm dY=dz=-φt_rel*h/l=3.mm expected

nominal x,y,z = -926.2499 3436.9420 14142.4975
corrected x,y,z =-926.0750 3440.2296 14160.1952 dz = 20 mm, dy = 3mm OK

EML- side A external side

- Endcap, sector 5, side A
- ➛ amdb local **szt** frame is oriented like x,y,z global



1st tube, 1st tube layer, 1st multi layer, RO side (@s-): s_rel=-1,z_rel=-1,t_rel=1;
φ=20, dZ=dt=φz_rel=-20mm dY=dz=-φt_rel*h/l=-3mm expected

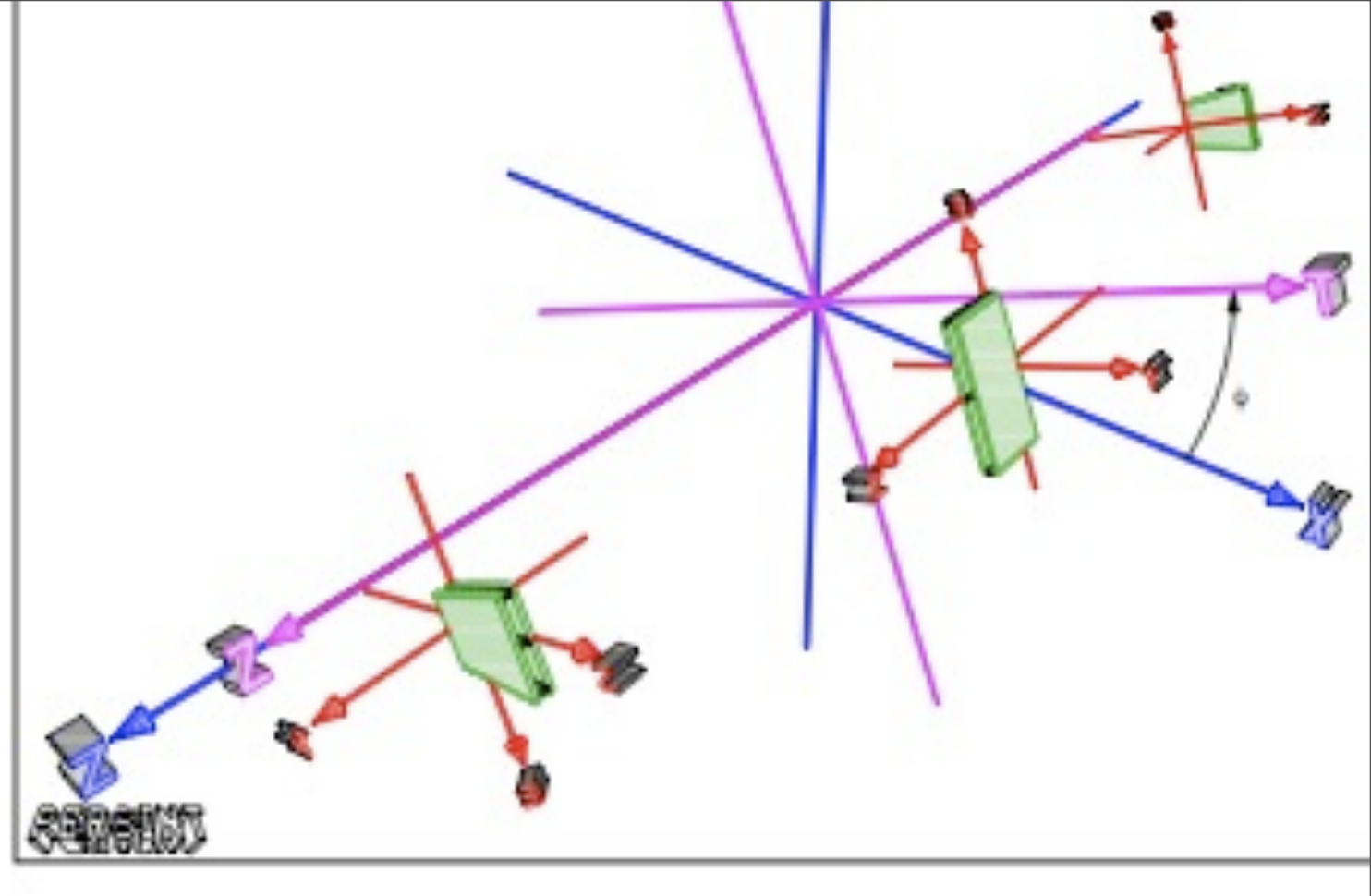
nominal x,y,z =-566.2500 1785.0170 14446.5805
corrected x,y,z =565.9335 1781.6197 14427.9568 dz= -20 mm, dy = -3mm OK

last tube, 1st tube layer, 1st multi layer, RO side (@s-): s_rel=-1,z_rel=1,t_rel=1;
φ=20, dZ=dt=φz_rel=20mm dY=dz=-φt_rel*h/l=-3.mm expected

nominal x,y,z = -926.2499 3436.9420 14446.5805
corrected x,y,z =-926.0750 3433.6543 14464.2782 dz = 20 mm, dy = -3mm OK

EML- side C internal side

- Endcap, sector 5, side C
- ➛ amdb local **szt** frame is oriented like -x,y,-z global



1st tube, 1st tube layer, 1st multi layer, RO side (@s+): s_rel=+1,z_rel=-1,t_rel=-1;
φ=-20, dZ=dt=φz_rel=20mm dY=dz=-φt_rel*h/l=-3mm expected

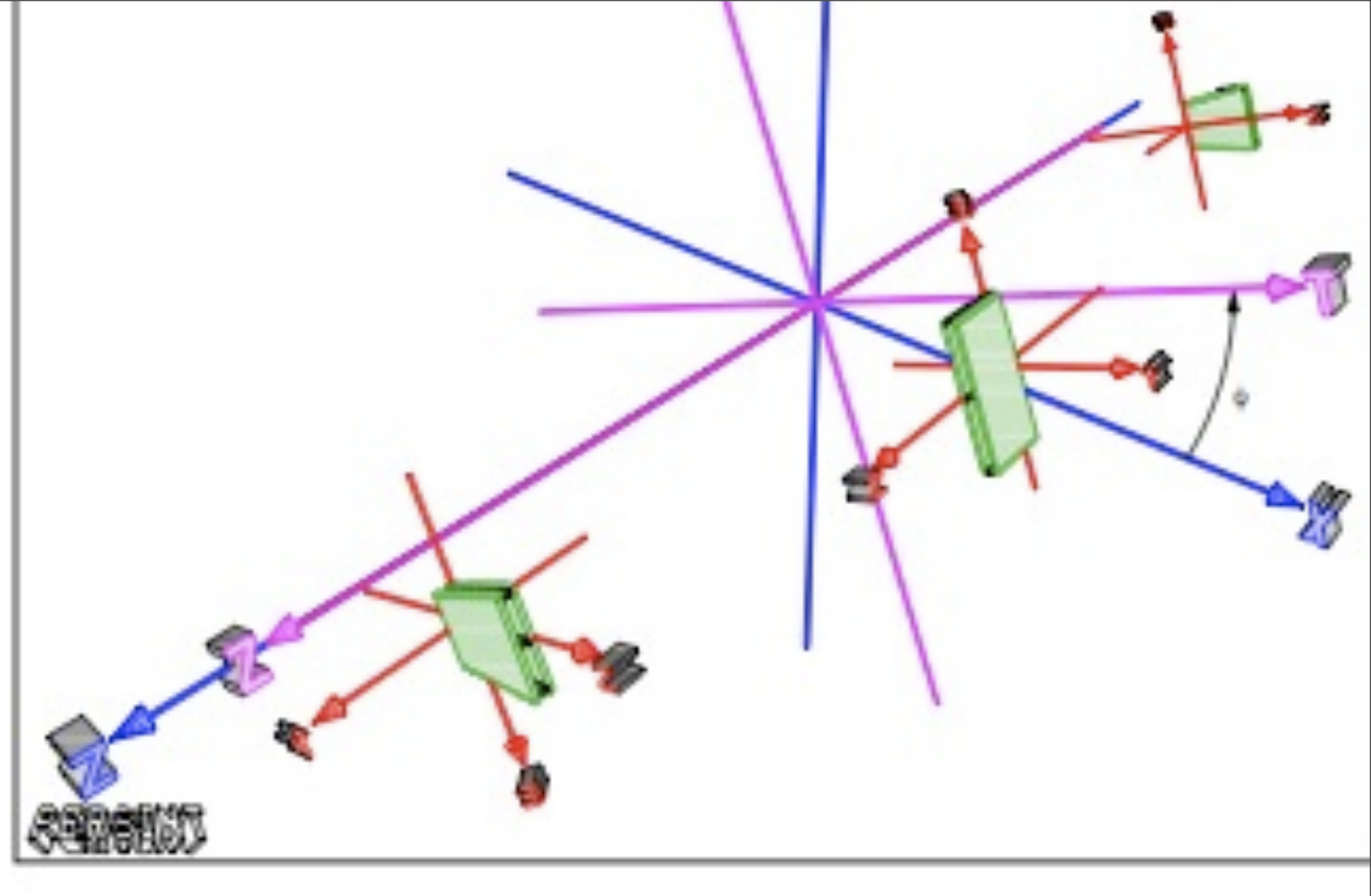
nominal x,y,z =-566.2500 1785.0170 -14142.4975
corrected x,y,z =-565.9335 1781.6197 -14161.1212 dz=20 mm, dy = -3mm OK

last tube, 1st tube layer, 1st multi layer, RO side (@s+): s_rel=+1,z_rel=1,t_rel=-1;
φ=-20, dZ=dt=φz_rel=-20mm dY=dz=-φt_rel*h/l=-3.mm expected

nominal x,y,z = -926.2499 3436.9420 -14142.4975
corrected x,y,z =-926.0750 3433.6543 -14124.7998 dz =-20 mm, dy =-3mm OK

EML- side C external side

- Endcap, sector 5, side C
- ➛ amdb local **szt** frame is oriented like -x,y,-z global



1st tube, last tube layer, last multi layer, RO side (@s+): s_rel=+1,z_rel=-1,t_rel=1;
φ=-20, dZ=dt=φz_rel=20mm dY=dz=-φt_rel*h/l=3mm expected

nominal x,y,z =-566.2500 1785.0170 -14446.5805
corrected x,y,z =-565.9335 1788.4143 -14465.2042 dz=20 mm, dy = 3mm OK

last tube, last tube layer, last multi layer, RO side (@s+): s_rel=+1,z_rel=1,t_rel=1;
φ=-20, dZ=dt=φz_rel=-20mm dY=dz=-φt_rel*h/l=3.mm expected

nominal x,y,z =-926.2499 3436.9420 -14446.5805
corrected x,y,z =-926.0750 3440.2296 -14428.8827 dz =-20 mm, dy =3mm OK