(group alphabet)(Level #)(name)(distinction #)(distinction alphabet)(distinction #)
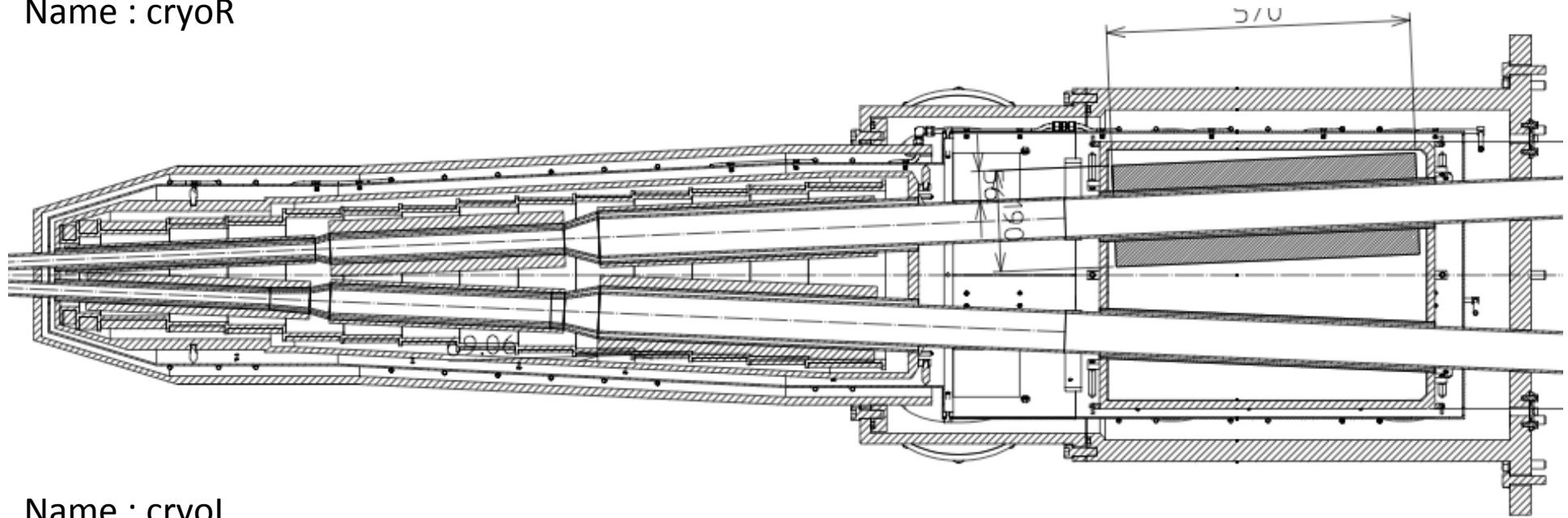
Group & level

Kind of volume

Kind of parameter

ex) B1wal1r1
Group : B
Level : 1
volume : wall # 1
parameter : radius # 1

Mainly used for
r : radius
i : inner radius
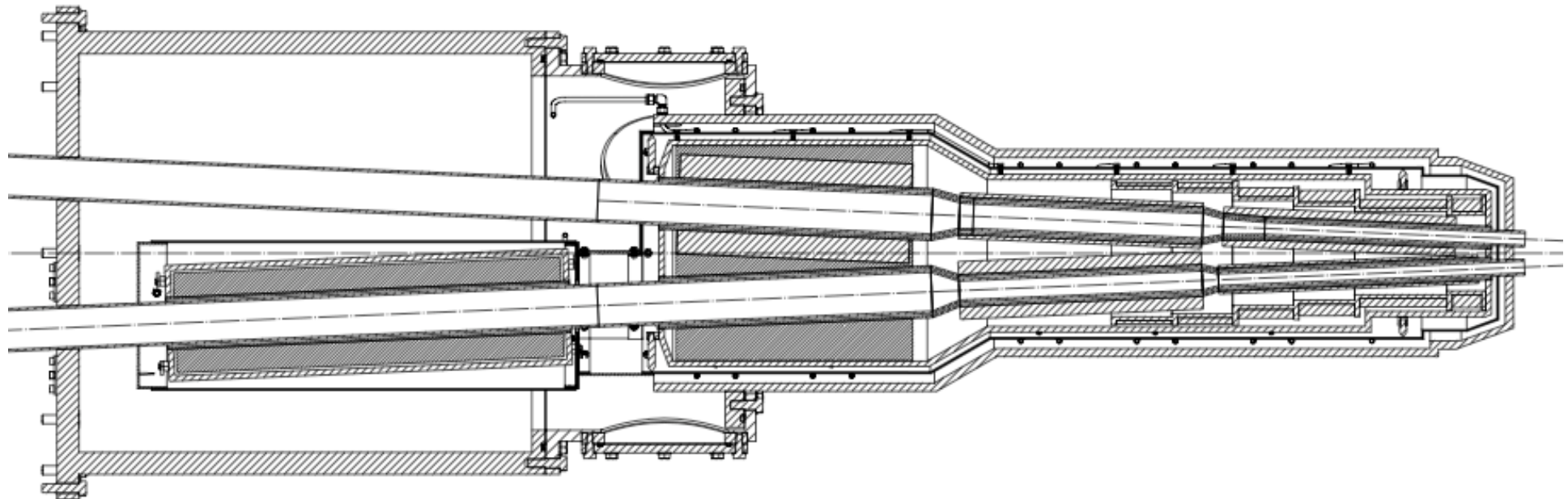o : outer radius
l : length
t : thickness
d : distance
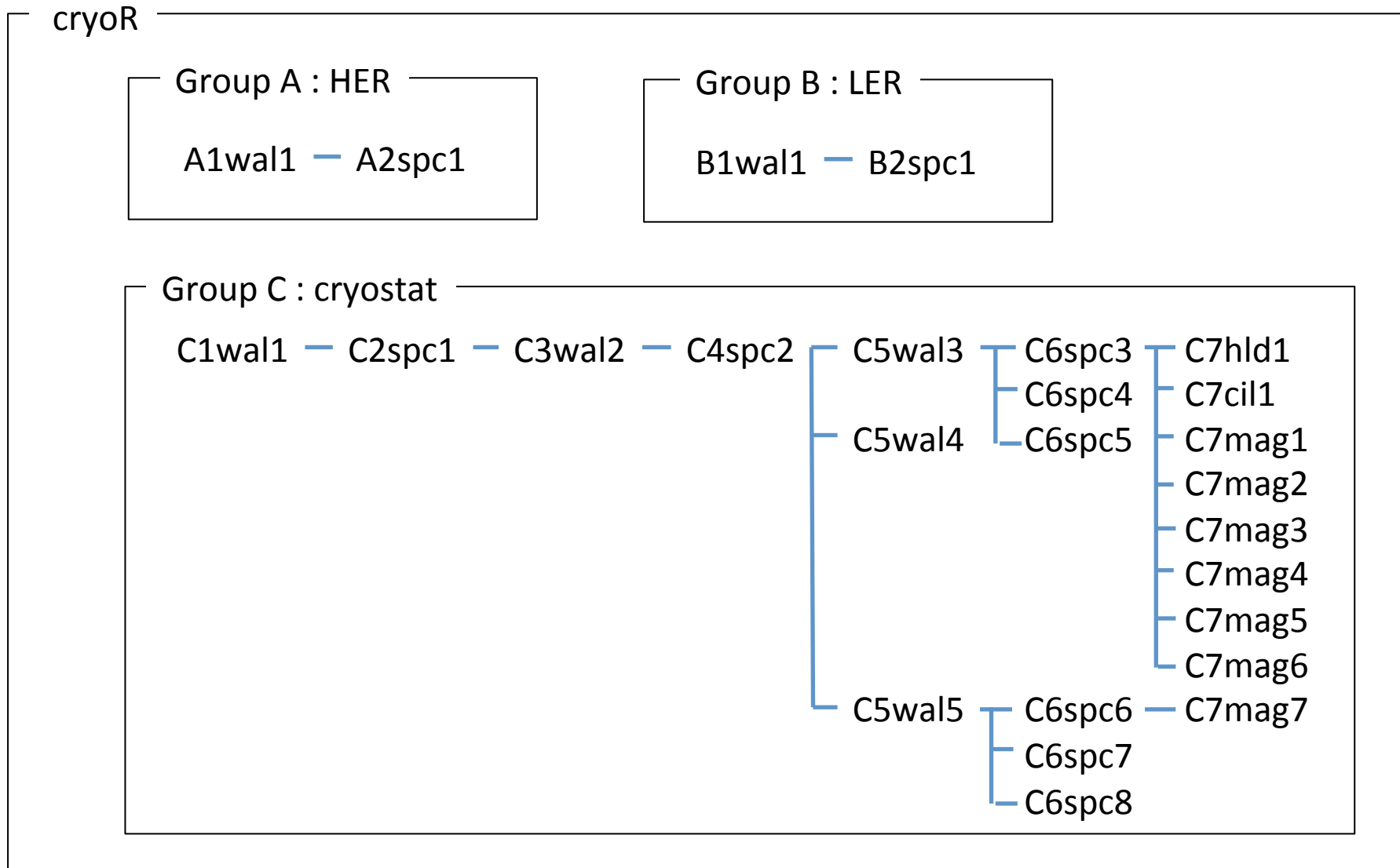a : angle

* "Level" means depth of Node

Volumes of "QCs"

Name : cryoR

Name : cryoL

Volume name and level for cryoR

cryoR

Group A : HER

A1wal1 — A2spc1

Group B : LER

B1wal1 — B2spc1

Group C : cryostat

C1wal1 — C2spc1 — C3wal2 — C4spc2
- C5wal3
  - C6spc3
    - C7hld1
  - C6spc4
    - C7cil1
  - C6spc5
    - C7mag1
    - C7mag2
    - C7mag3
    - C7mag4
    - C7mag5
    - C7mag6
- C5wal4
- C5wal5
  - C6spc6 — C7mag7
  - C6spc7
  - C6spc8

*wal (wall), spc (space), cil (coil), pip (pipe), mag (magnet), hld (holder)

A1wal1 (Pcon – "box")   A2spc1 (Pcon * "A1wal1")

be subtracted by box

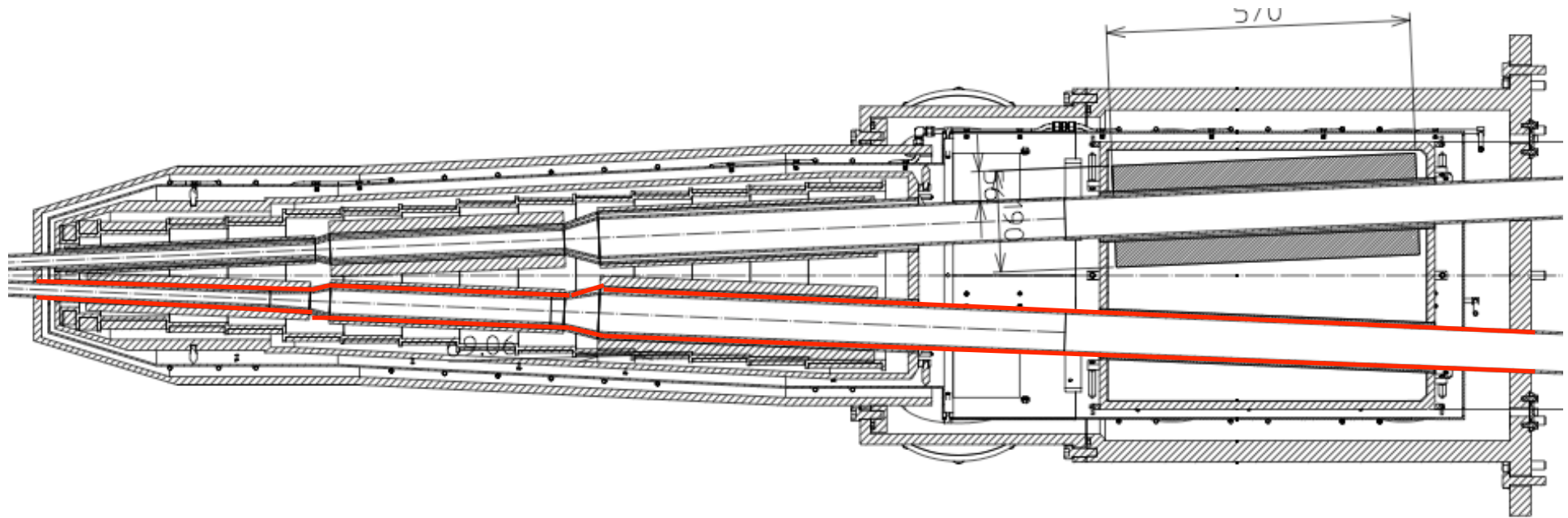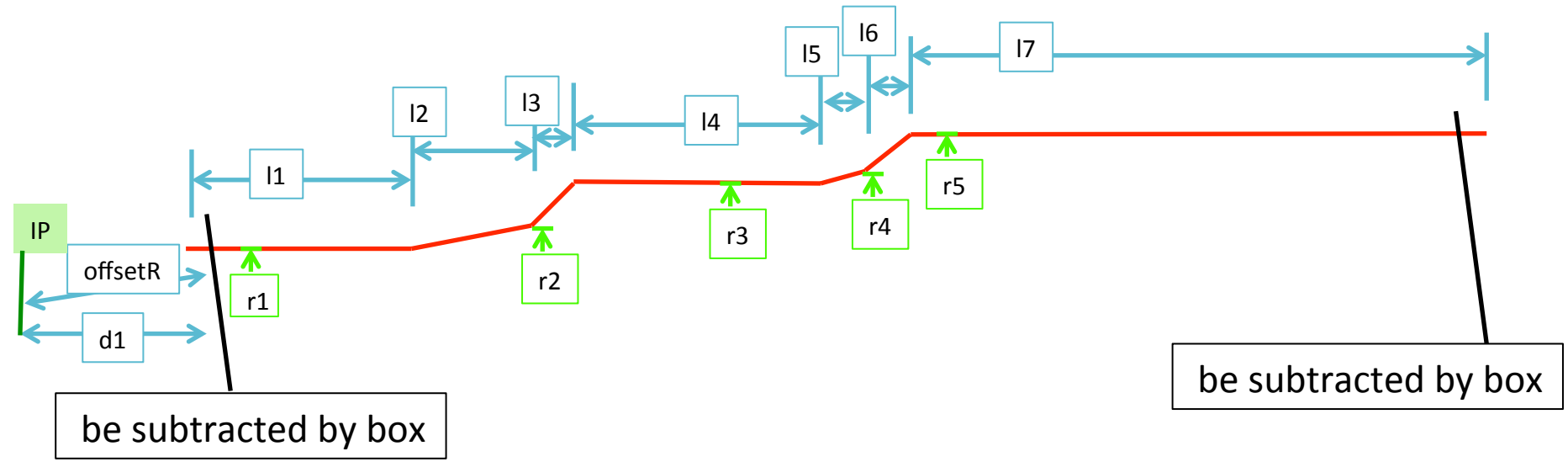be subtracted by box
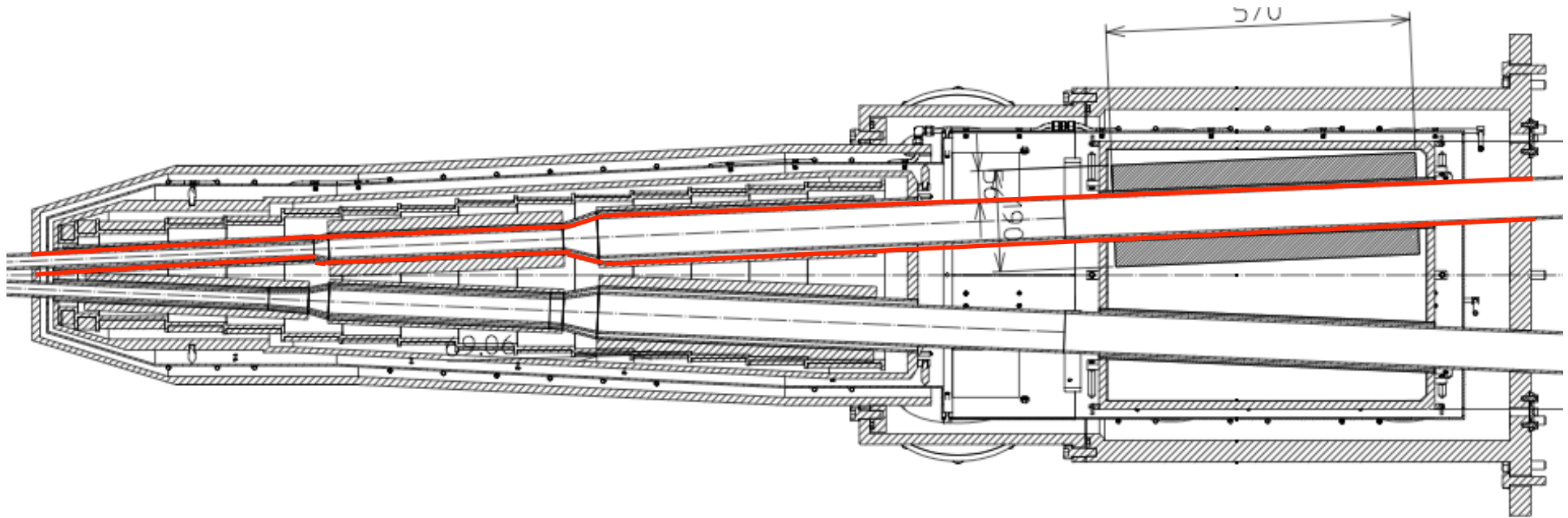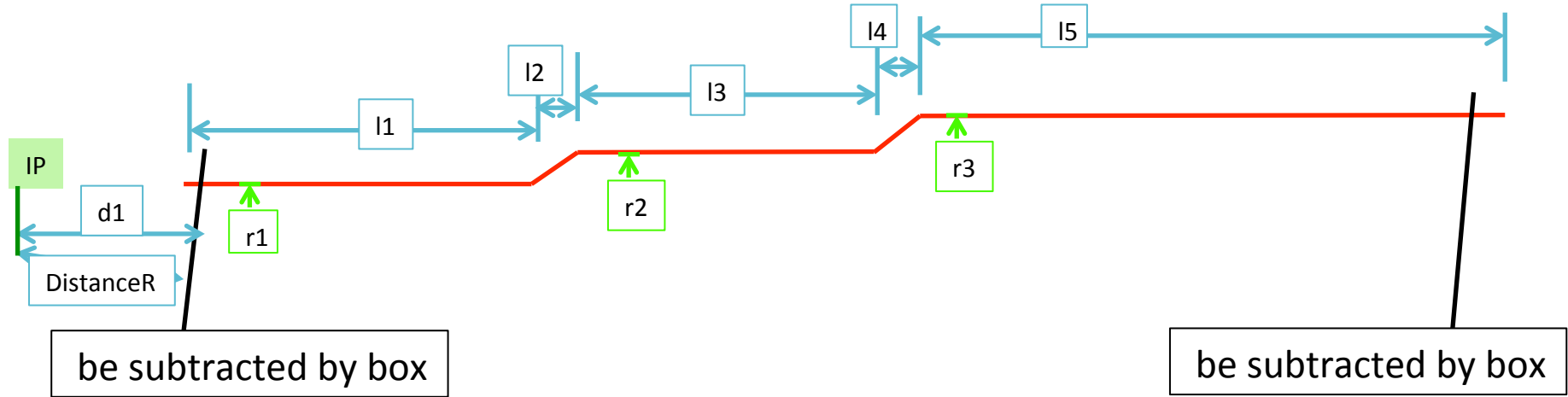
```
TGeoCompositeShape* geoA1wal1 = new TGeoCompositeShape("geoA1wal1name","geoA1wal1pconname:rotHERname - geoA1tub1name");
TGeoVolume *volA1wal1 = new TGeoVolume("volA1wal1name", geoA1wal1, strMedA1wal1);


TGeoCompositeShape* geoA2spc1 = new TGeoCompositeShape("geoA2spc1name","geoA2spc1pconname:rotHERname * geoA1wal1name");
TGeoVolume *volA2spc1 = new TGeoVolume("volA2spc1name", geoA2spc1, strMedA2spc1);
```
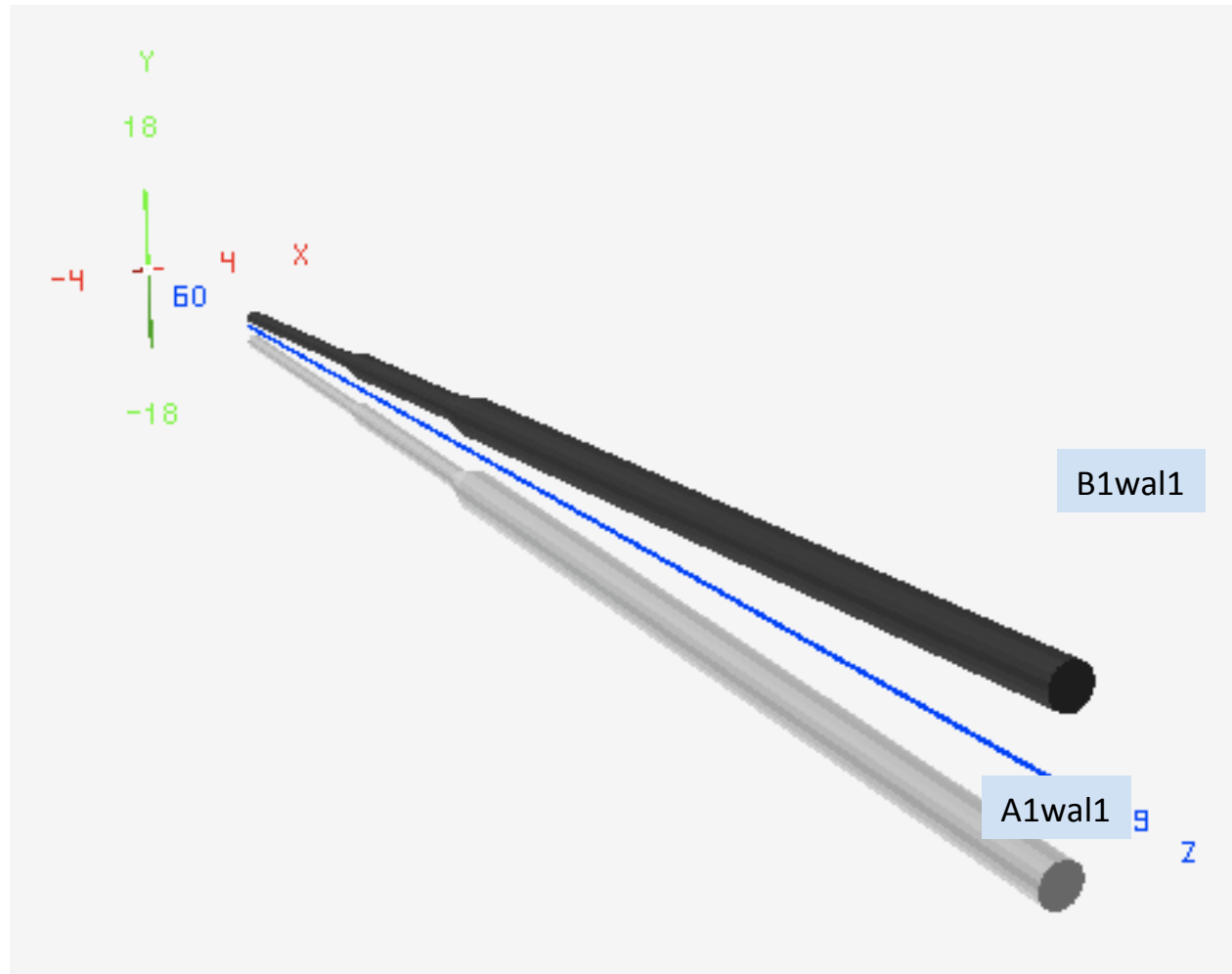

A1wal1
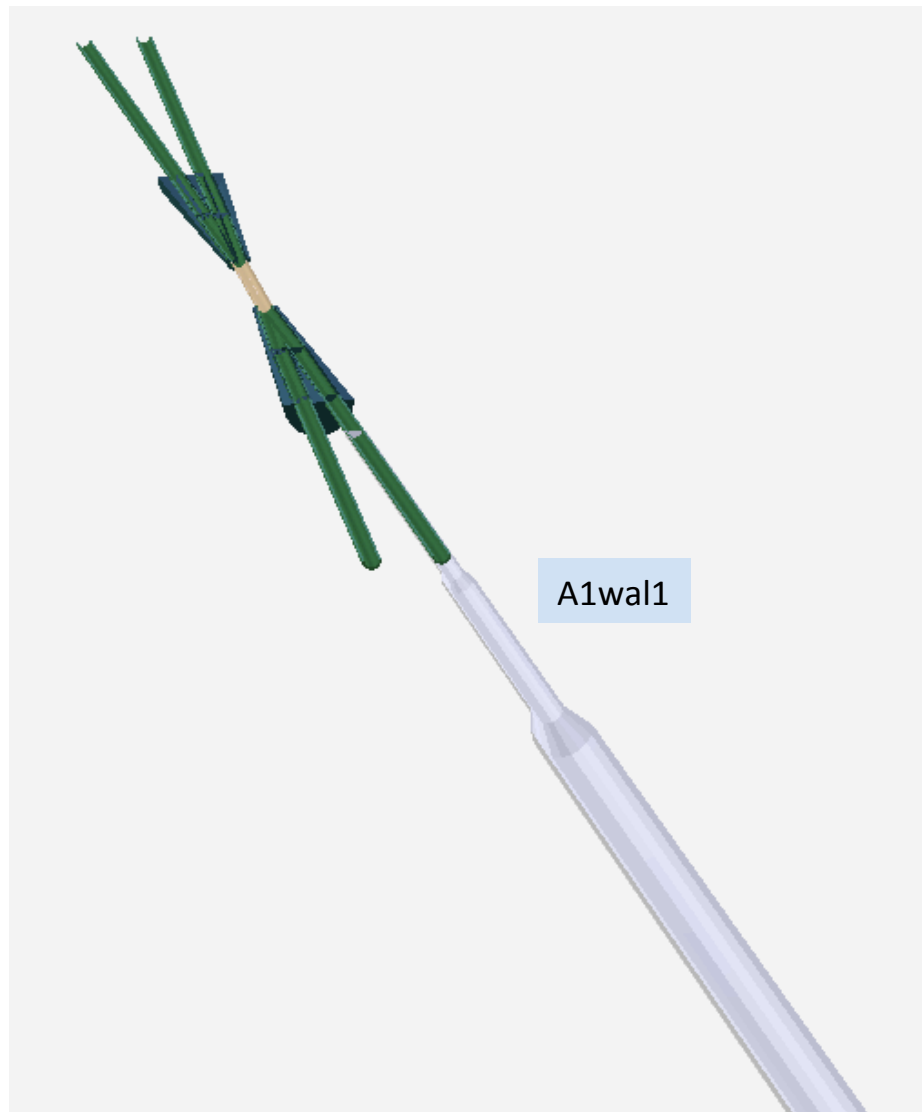
A1wal1

A2spc1

B1wal1 (Pcon – "box")   B2spc1 (Pcon * "A1wal1")

IP

offsetR

d1

l1

l2

l3

l4

l5

l6

l7

r1

r2

r3

r4

r5

be subtracted by box

be subtracted by box

```cpp
TGeoCompositeShape* geoB1wal1 = new TGeoCompositeShape("geoB1wal1name","geoB1wal1pconname:rotLERname - geoA1tub1name");
TGeoVolume *volB1wal1 = new TGeoVolume("volB1wal1name", geoB1wal1, strMedB1wal1);

TGeoCompositeShape* geoB2spc1 = new TGeoCompositeShape("geoB2spc1name","geoB2spc1pconname:rotLERname * geoB1wal1name");
TGeoVolume *volB2spc1 = new TGeoVolume("volB2spc1name", geoB2spc1, strMedB2spc1);
```
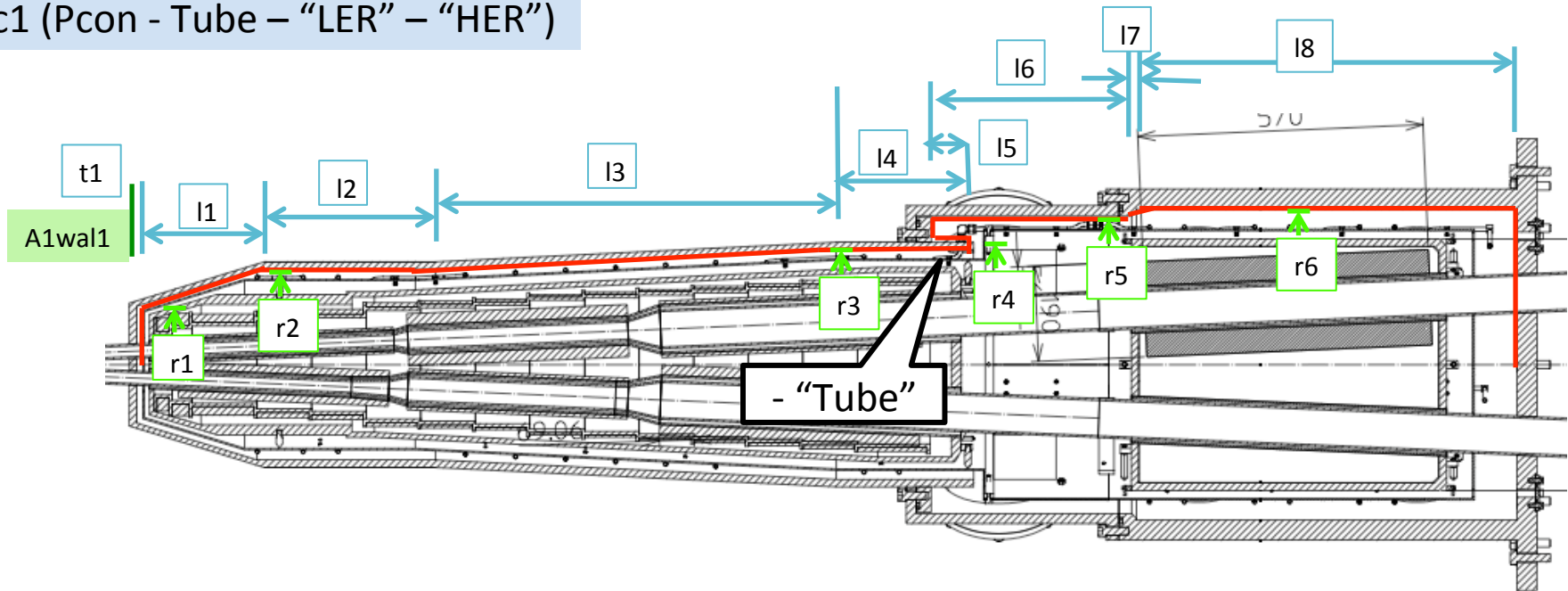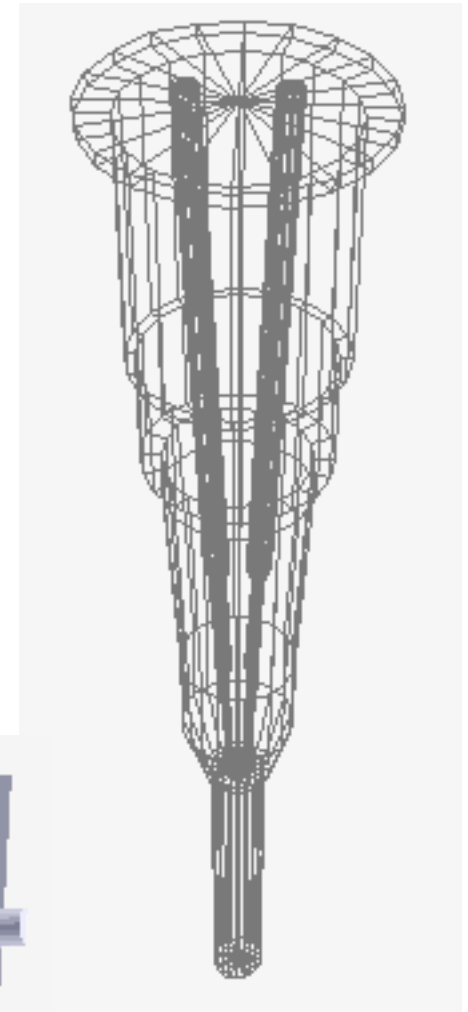
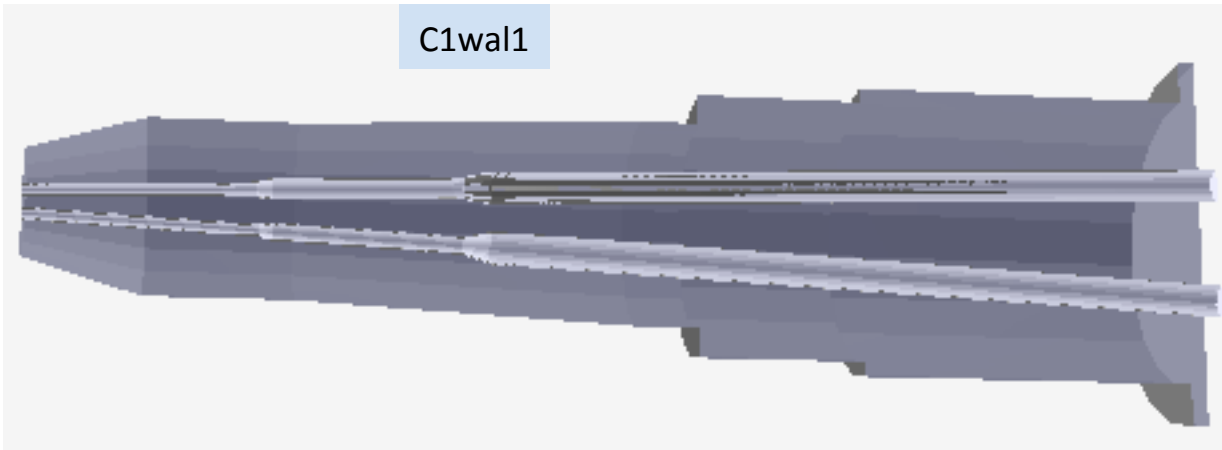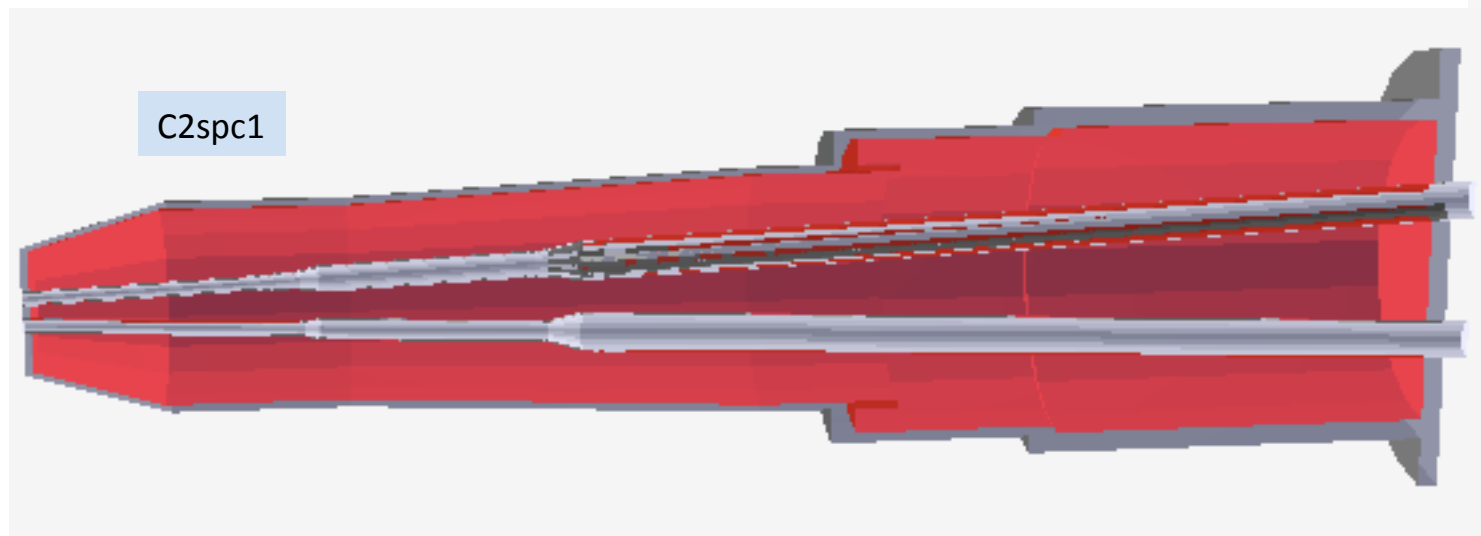C1wal1 (Pcon – "LER" – "HER")
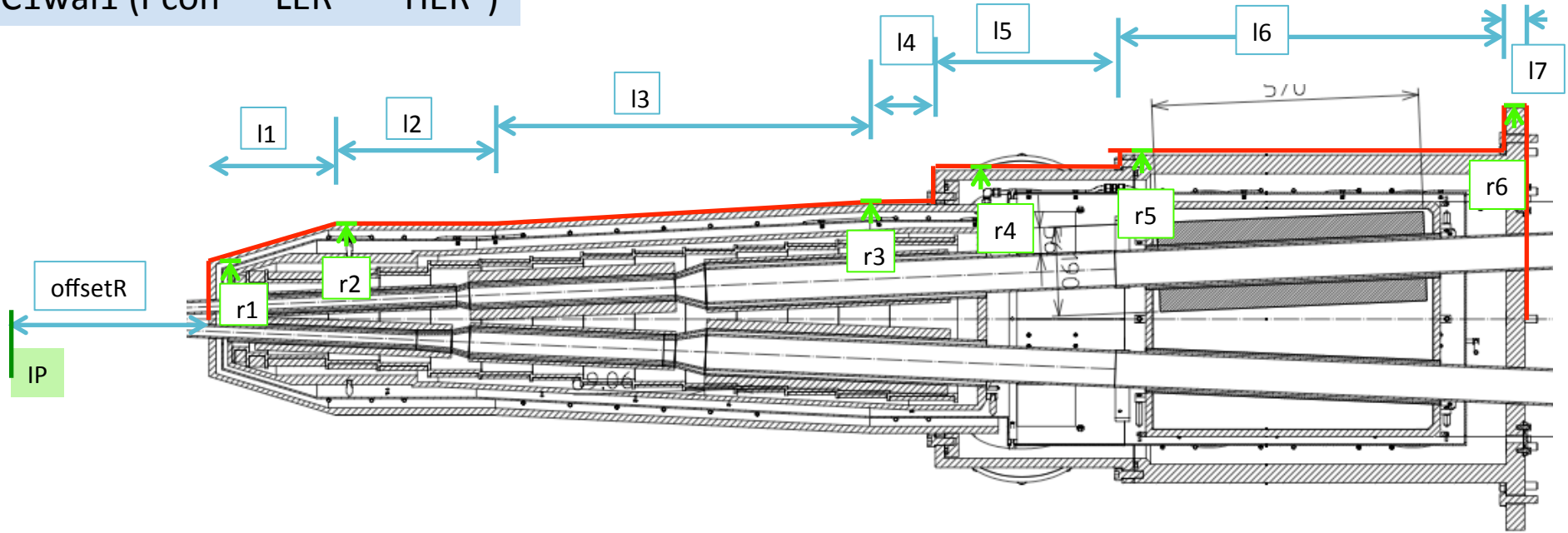
C2spc1 (Pcon - Tube – "LER" – "HER")

```
TGeoCompositeShape* geoB2spc1 = new TGeoCompositeShape("geoB2spc1name","geoB2spc1pconname:rotLERname * geoB1wal1name");
TGeoVolume *volB2spc1 = new TGeoVolume("volB2spc1name", geoB2spc1, strMedB2spc1);

TGeoCompositeShape* geoC2spc1 = new TGeoCompositeShape("geoC2spc1name","geoC2spc1pconname - geoC2spc1tubname - geoA1wal1name - geoB1wal1name");
TGeoVolume *volC2spc1 = new TGeoVolume("volC2spc1name", geoC2spc1, strMedC2spc1);
```
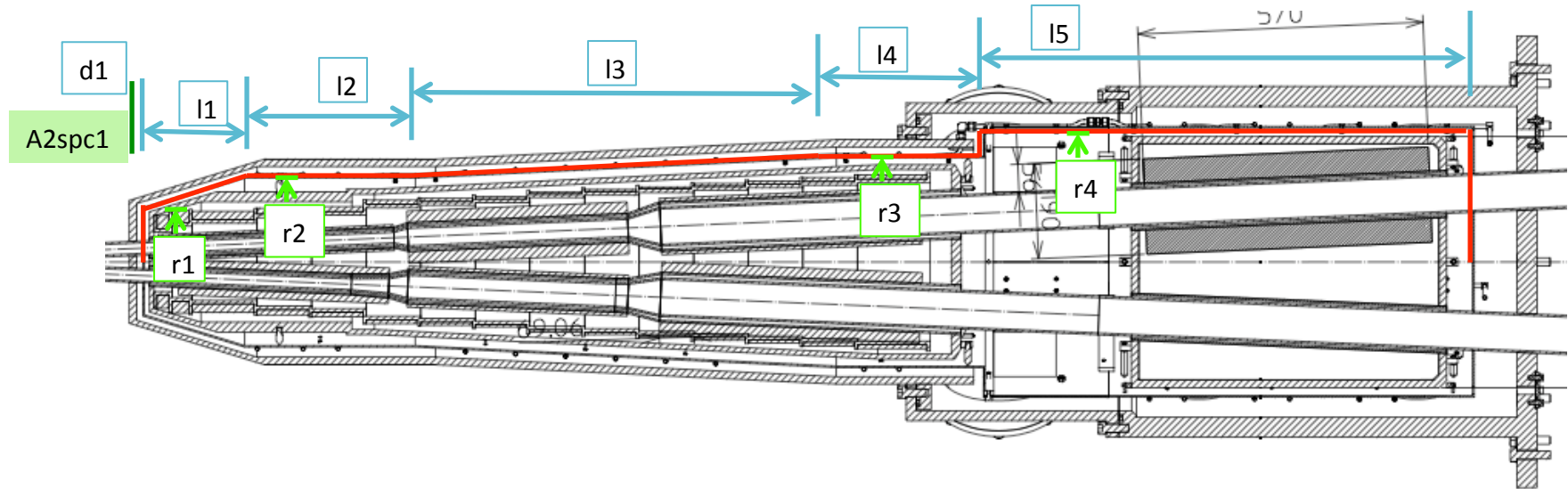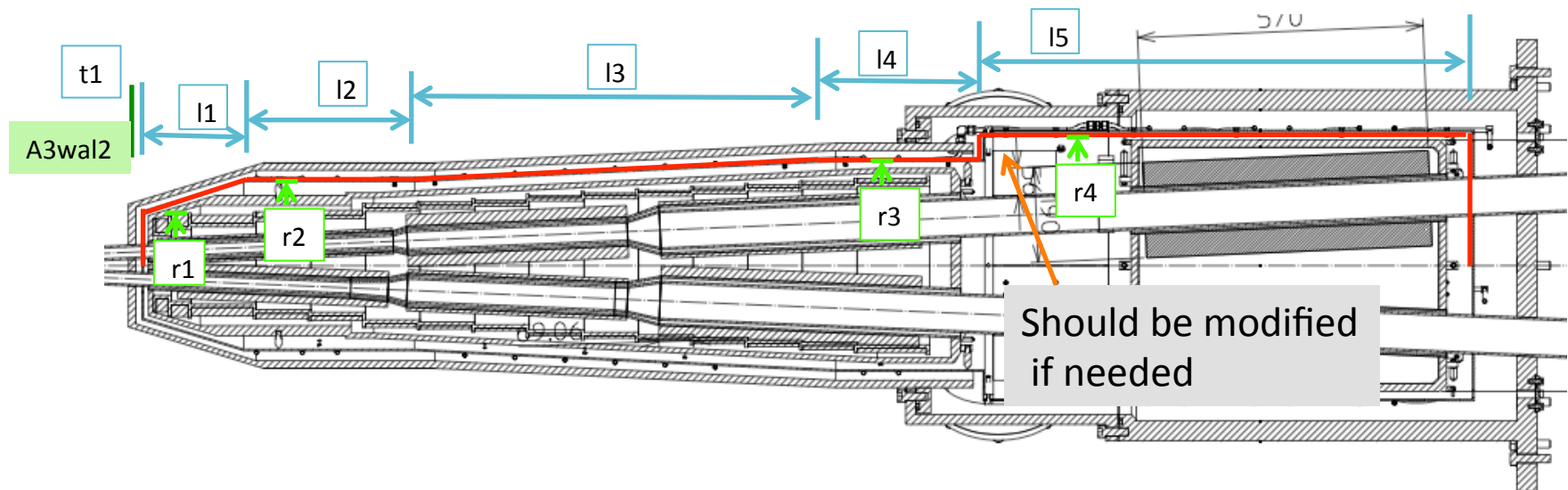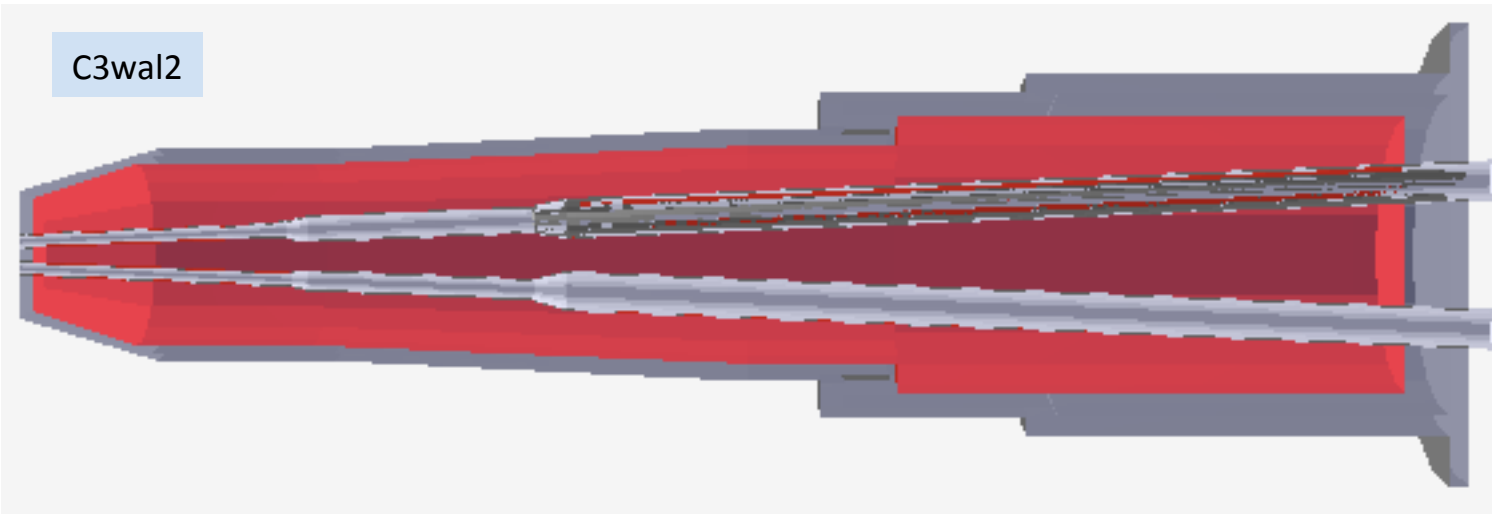
C1wal1

C2spc1

C3wal2 (Pcon – "LER" – "HER")

d1
A2spc1
l1 l2 l3 l4 l5
570
r1 r2 r3 r4

C4spc2 (Pcon – "LER" – "HER")

t1
A3wal2
l1 l2 l3 l4 l5
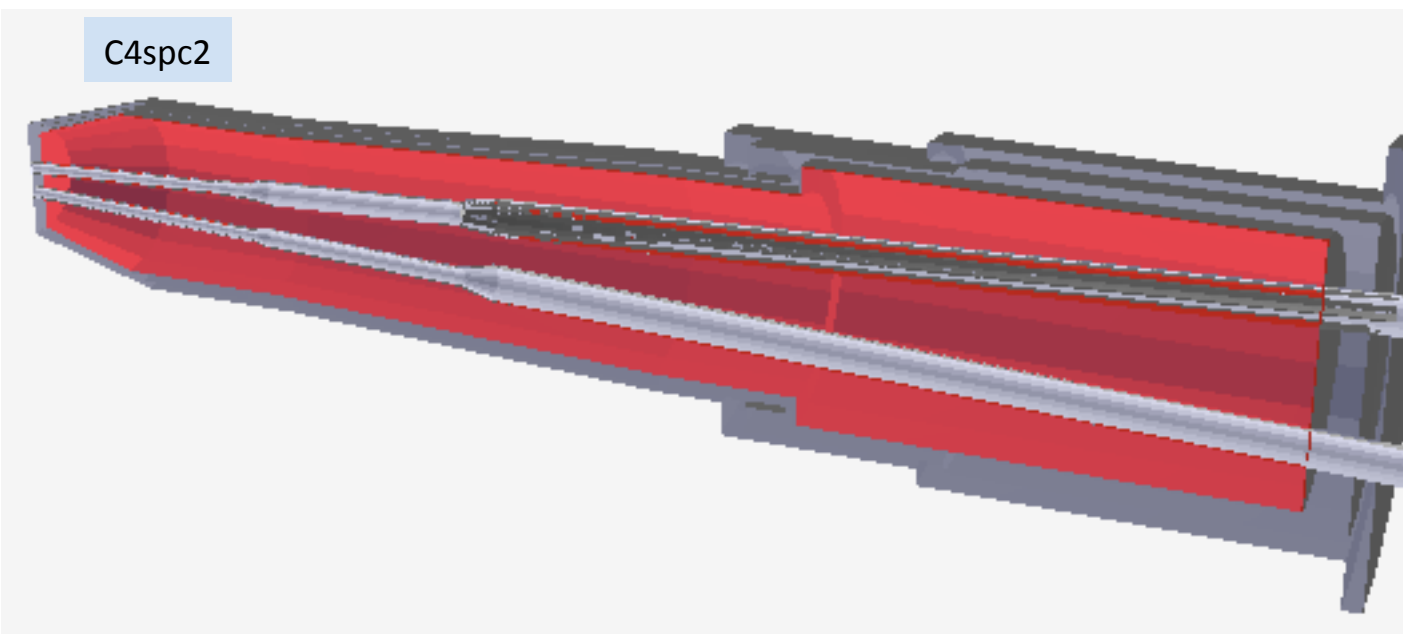570
r1 r2 r3 r4

Should be modified if needed

```cpp
TGeoCompositeShape* geoC3wal2 = new TGeoCompositeShape("geoC3wal2name","geoC3wal2pconname - geoA1wal1name - geoB1wal1name");
TGeoVolume *volC3wal2 = new TGeoVolume("volC3wal2name", geoC3wal2, strMedC3wal2);
```
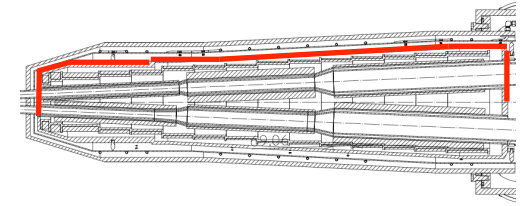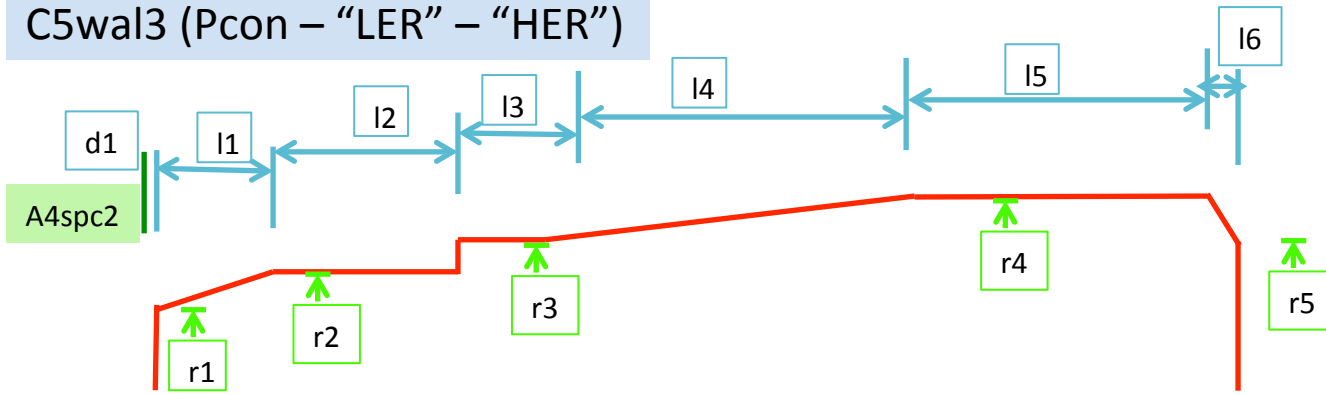

C3wal2

```cpp
TGeoCompositeShape* geoC4spc2 = new TGeoCompositeShape("geoC4spc2name","geoC4spc2pconname - geoA1wal1name - geoB1wal1name");
TGeoVolume *volC4spc2 = new TGeoVolume("volC4spc2name", geoC4spc2, strMedC4spc2);
```
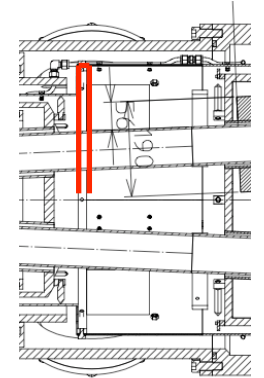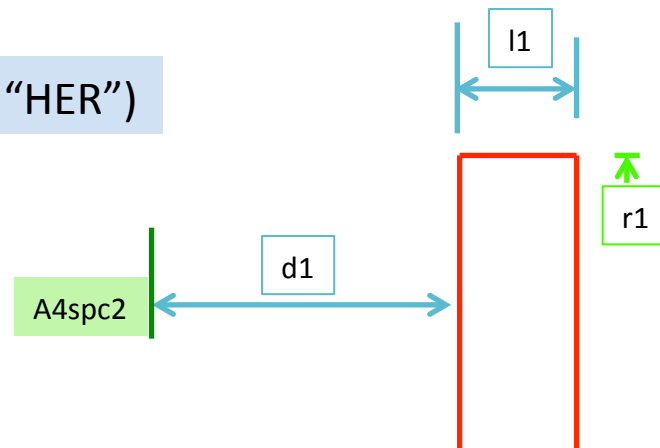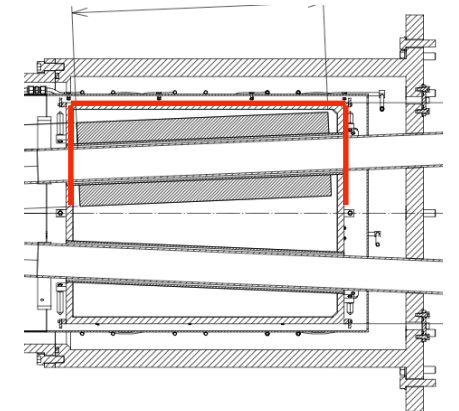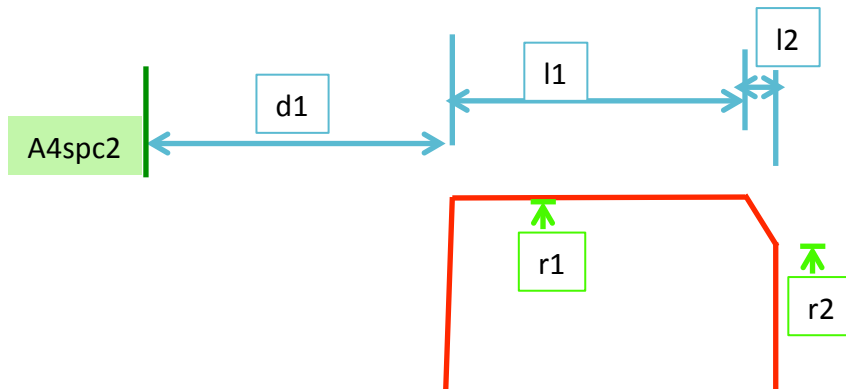

C4spc2

C5wal3 (Pcon – "LER" – "HER")

d1 l1 l2 l3 l4 l5 l6

A4spc2

r1 r2 r3 r4 r5

C5wal4 (Pcon – "LER" – "HER")

l1

A4spc2 d1 r1

C5wal5 (Pcon – "LER" – "HER")

A4spc2 d1 l1 l2

r1 r2

```
TGeoCompositeShape* geoC5wal3 = new TGeoCompositeShape("geoC5wal3name","geoC5wal3pconname - geoA1wal1name - geoB1wal1name");
TGeoVolume *volC5wal3 = new TGeoVolume("volC5wal3name", geoC5wal3, strMedC5wal3);

TGeoCompositeShape* geoC5wal4 = new TGeoCompositeShape("geoC5wal4name","geoC5wal4pconname - geoA1wal1name - geoB1wal1name");
TGeoVolume *volC5wal4 = new TGeoVolume("volC5wal4name", geoC5wal4, strMedC5wal4);

TGeoCompositeShape* geoC5wal5 = new TGeoCompositeShape("geoC5wal5name","geoC5wal5pconname - geoA1wal1name - geoB1wal1name");
TGeoVolume *volC5wal5 = new TGeoVolume("volC5wal5name", geoC5wal5, strMedC5wal5);
```
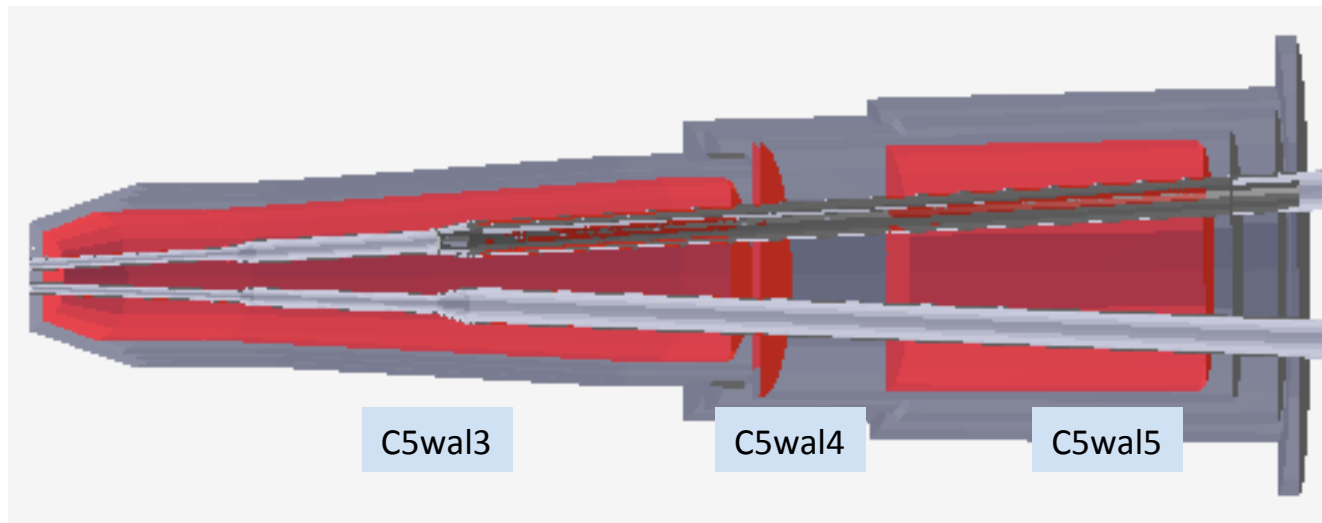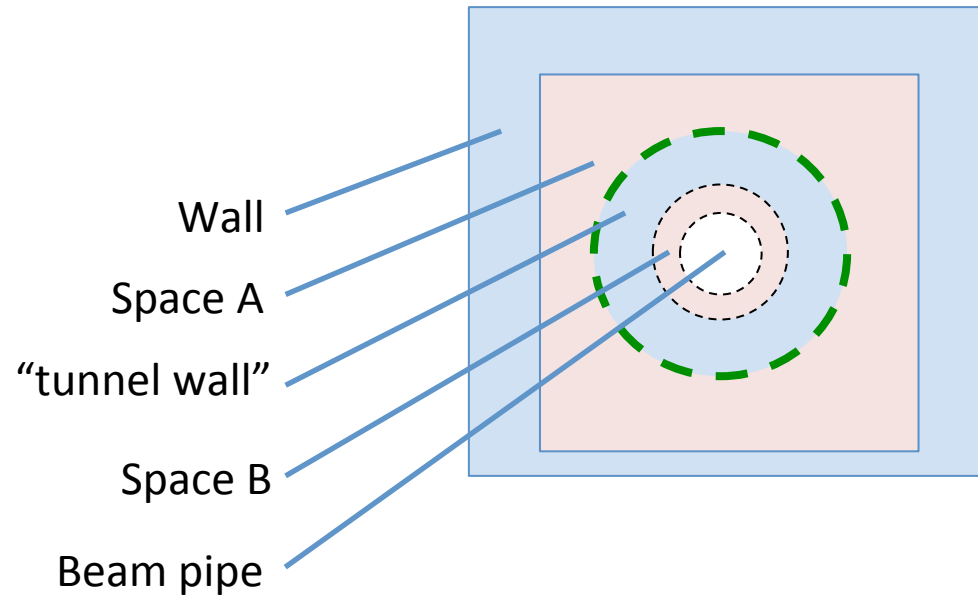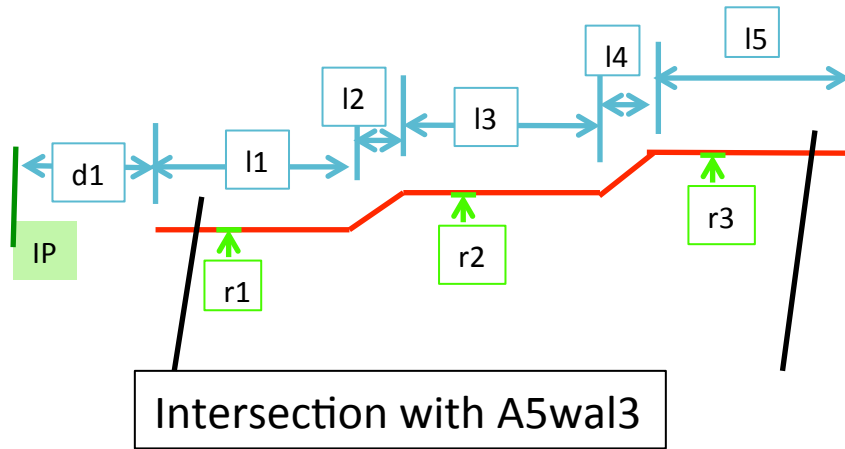

C5wal3   C5wal4   C5wal5

"tunnel wall" : used for subtraction

Wall

Space A

"tunnel wall"

Space B

Beam pipe

(Wall) − (Beam pipe)

(SpaceA) − (tunnel wall)

(SpaceB) − (Beam pipe)

C6spc4 ({Pcon – "HER"} * "A5wal3")

Space between cryostat and HER

IP

l5
l4
l2
l3
l1
d1
r1
r2
r3

Intersection with A5wal3

C6spc5 ({Pcon – "LER"} * "A5wal3")

Space between cryostat and LER

IP

l7
l6
l5
l3
l4
l2
l1
d1
r1
r2
r3
r4
r5

Intersection with A5wal3
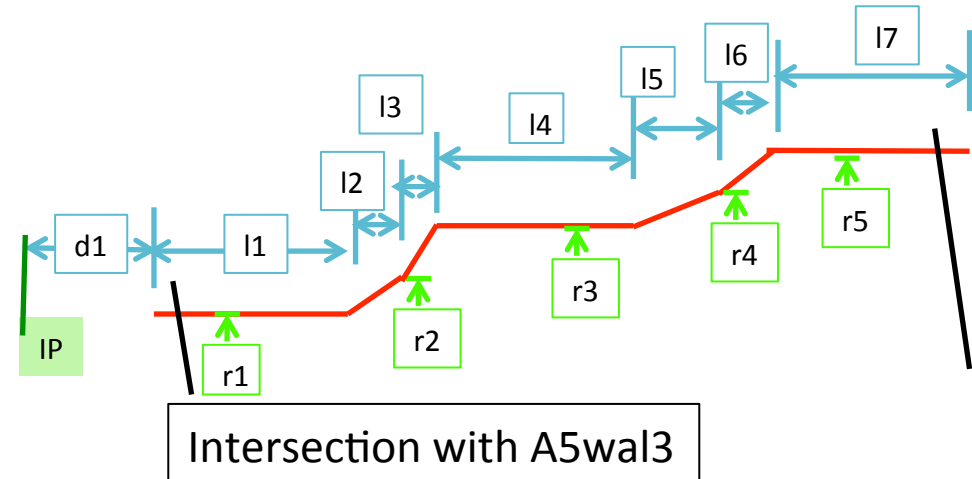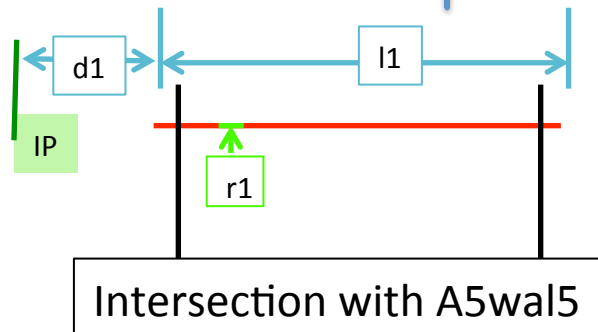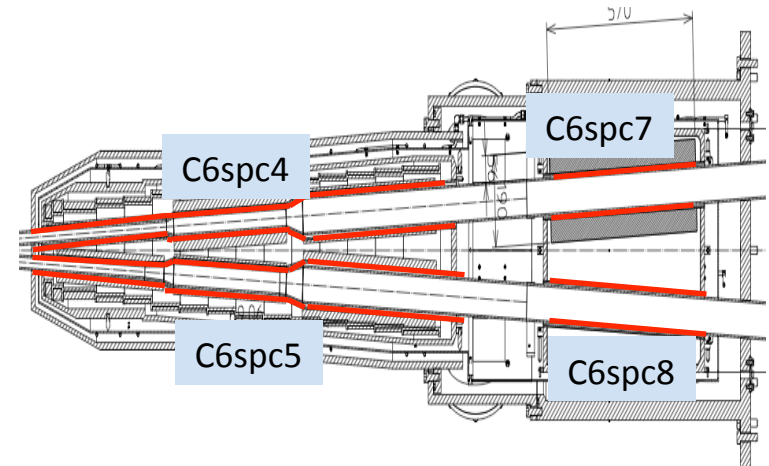
C6spc7 ({Pcon – "HER"} * "A5wal5")

Space between cryostat and HER

C6spc8 ({Pcon – "LER"} * "A5wal5")

Space between cryostat and LER

IP

d1
l1
r1
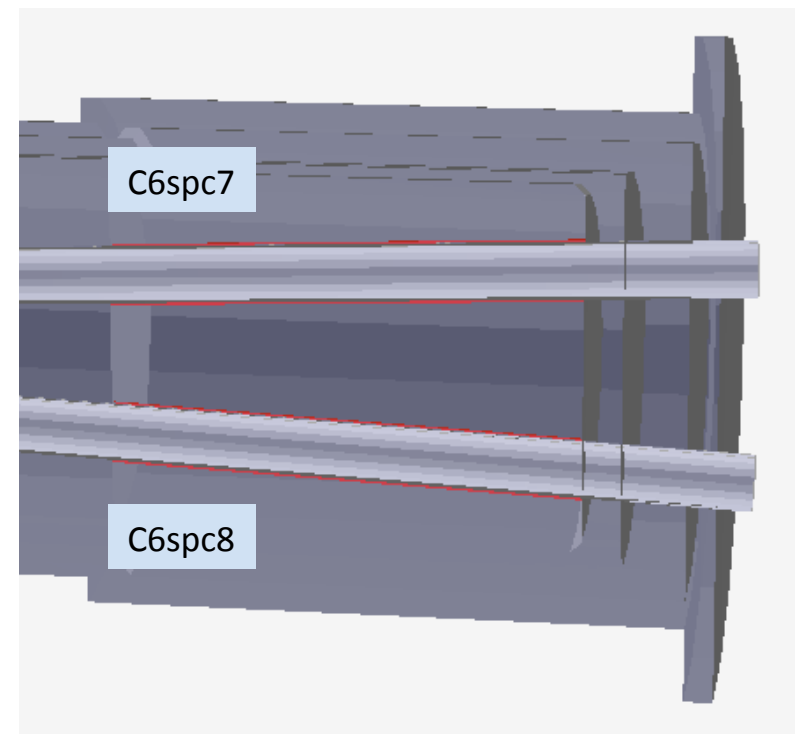
Intersection with A5wal5

C6spc4
C6spc7
C6spc5
C6spc8

```cpp
TGeoCompositeShape* geoC6spc8 = new TGeoCompositeShape("geoC6spc8name","(geoC6spc8pconname:rotLERname * geoC5wal5name) - geoB1wal1name");
TGeoVolume *volC6spc8 = new TGeoVolume("volC6spc8name", geoC6spc8, strMedC6spc8);

TGeoCompositeShape* geoC6spc7 = new TGeoCompositeShape("geoC6spc7name","(geoC6spc7pconname:rotHERname * geoC5wal5name) - geoA1wal1name");
TGeoVolume *volC6spc7 = new TGeoVolume("volC6spc7name", geoC6spc7, strMedC6spc7);

TGeoCompositeShape* geoC6spc5 = new TGeoCompositeShape("geoC6spc5name","(geoC6spc5pconname:rotLERname * geoC5wal3name) - geoB1wal1name");
TGeoVolume *volC6spc5 = new TGeoVolume("volC6spc5name", geoC6spc5, strMedC6spc5);


TGeoCompositeShape* geoC6spc4 = new TGeoCompositeShape("geoC6spc4name","(geoC6spc4pconname:rotHERname * geoC5wal3name) - geoA1wal1name");
TGeoVolume *volC6spc4 = new TGeoVolume("volC6spc4name", geoC6spc4, strMedC6spc4);
```
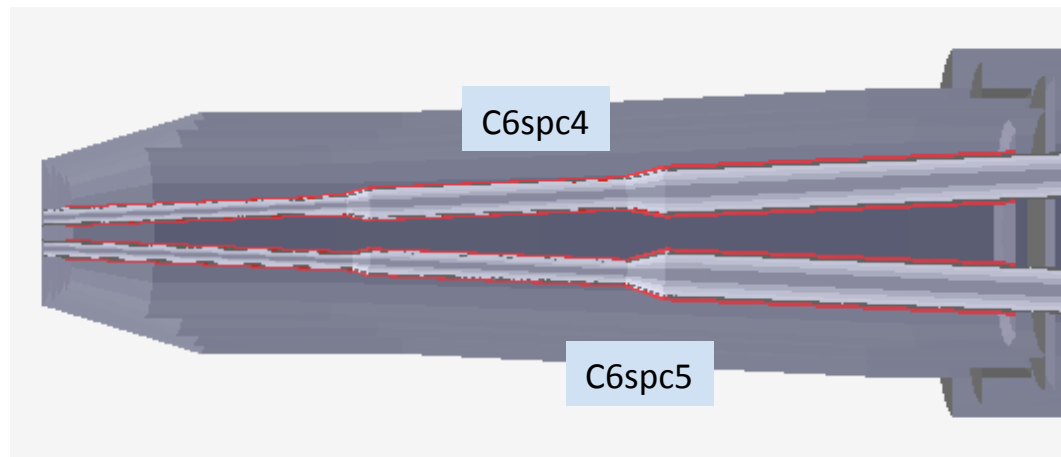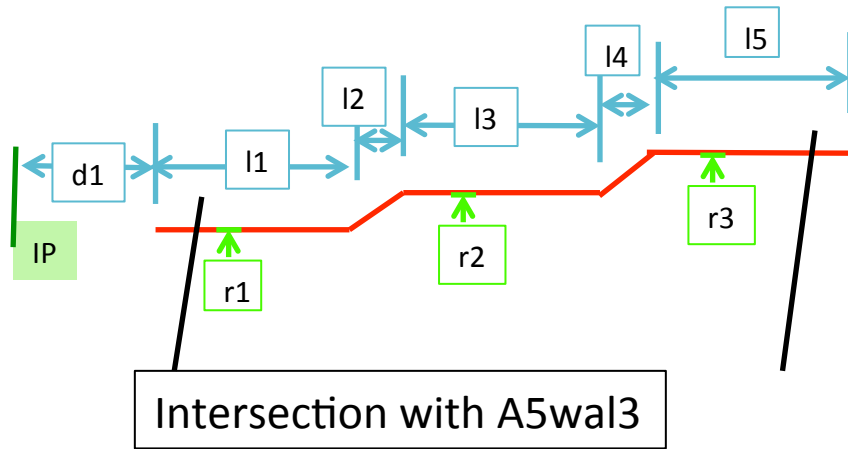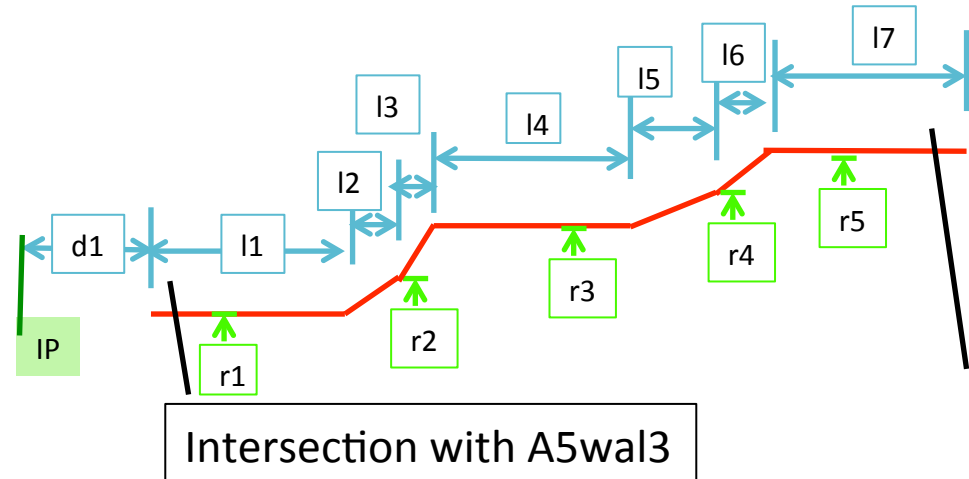

C6spc4

C6spc5

C6spc7

C6spc8

C6tnl1 (Pcon * "A5wal3")

Space between cryostat and HER

C6tnl2 (Pcon * "A5wal3")

Space between cryostat and LER

Intersection with A5wal3

Intersection with A5wal3
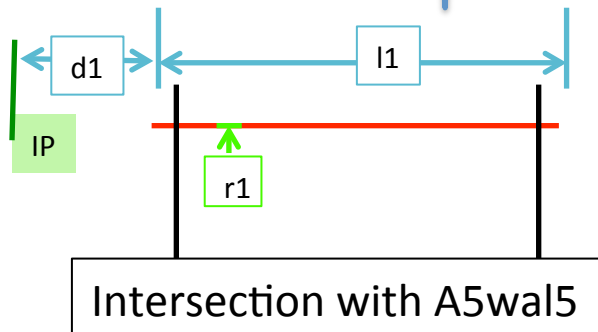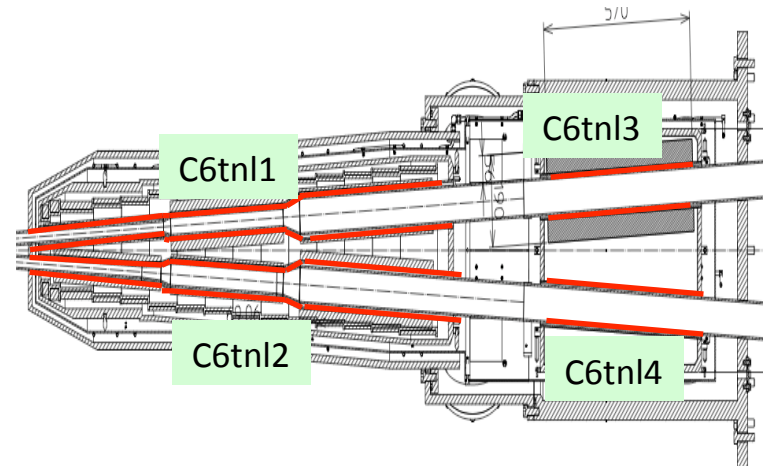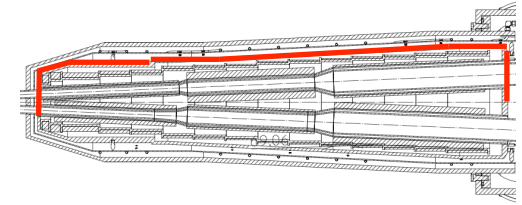
C6tnl3 (Pcon * "A5wal5")

Space between cryostat and HER

C6tnl4 ({Pcon * "A5wal5")

Space between cryostat and LER

Intersection with A5wal5

C6tnl3

C6tnl1
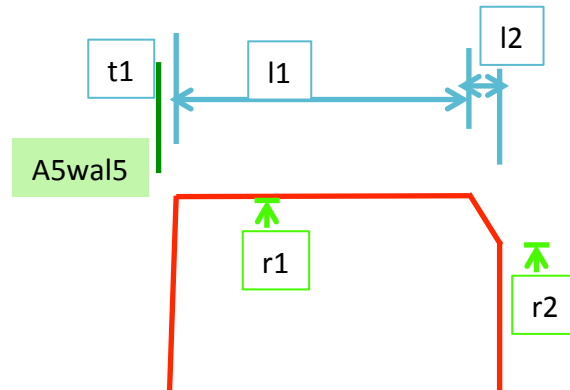
C6tnl2

C6tnl4

C6spc3 (Pcon – "tunnel wall")
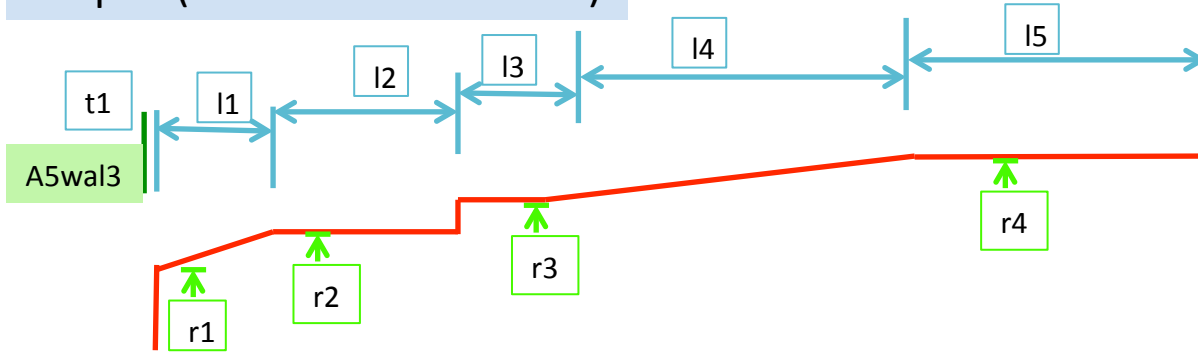
C6spc6 (Pcon – "tunnel wall")
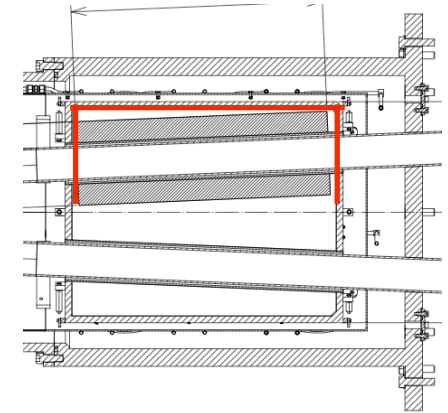
```cpp
TGeoCompositeShape* geoC6spc6 = new TGeoCompositeShape("geoC6spc6name","geoC6spc6pconname - geoC6tnl3pconname:rotHERname - geoC6tnl4pconname:rotLERname");
TGeoVolume *volC6spc6 = new TGeoVolume("volC6spc6name", geoC6spc6, strMedC6spc6);


TGeoCompositeShape* geoC6spc3 = new TGeoCompositeShape("geoC6spc3name","geoC6spc3pconname - geoC6tnl1pconname:rotHERname - geoC6tnl2pconname:rotLERname");
TGeoVolume *volC6spc3 = new TGeoVolume("volC6spc3name", geoC6spc3, strMedC6spc3);
```
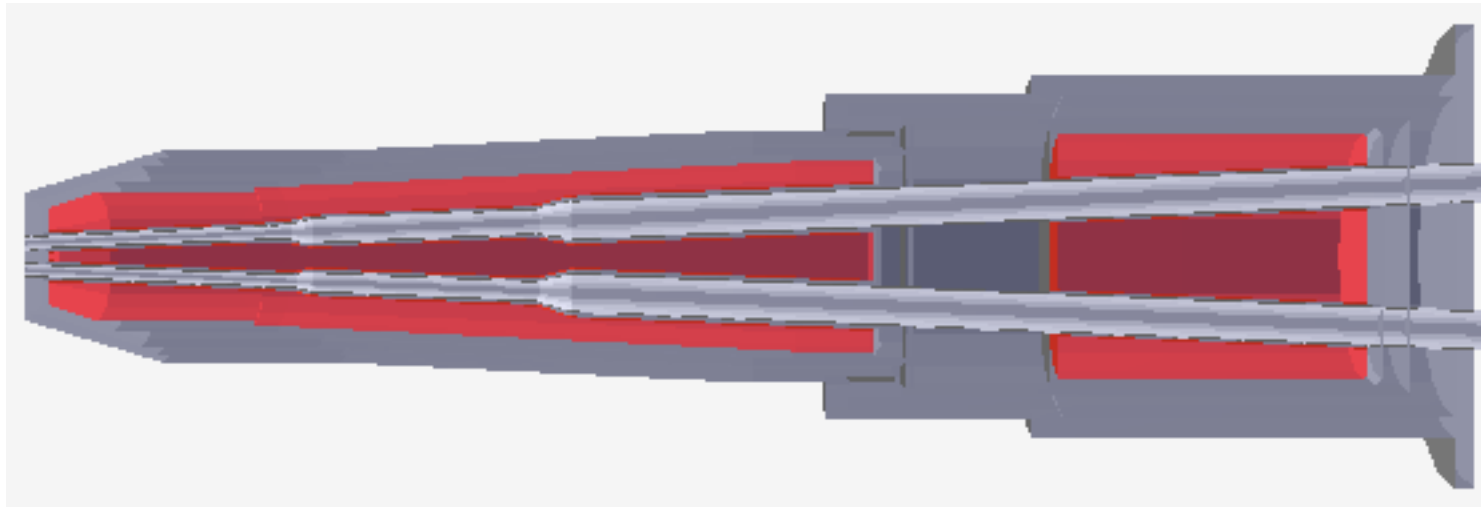
Level7

In C6spc3

C7hld1 (Pcon – "C7mag6")

C7cil1 (Pcon – "C7hld1" – "C7mag6")

C7mag1 (Pcon)

C7mag2 (Pcon)

C7mag3 (Pcon)
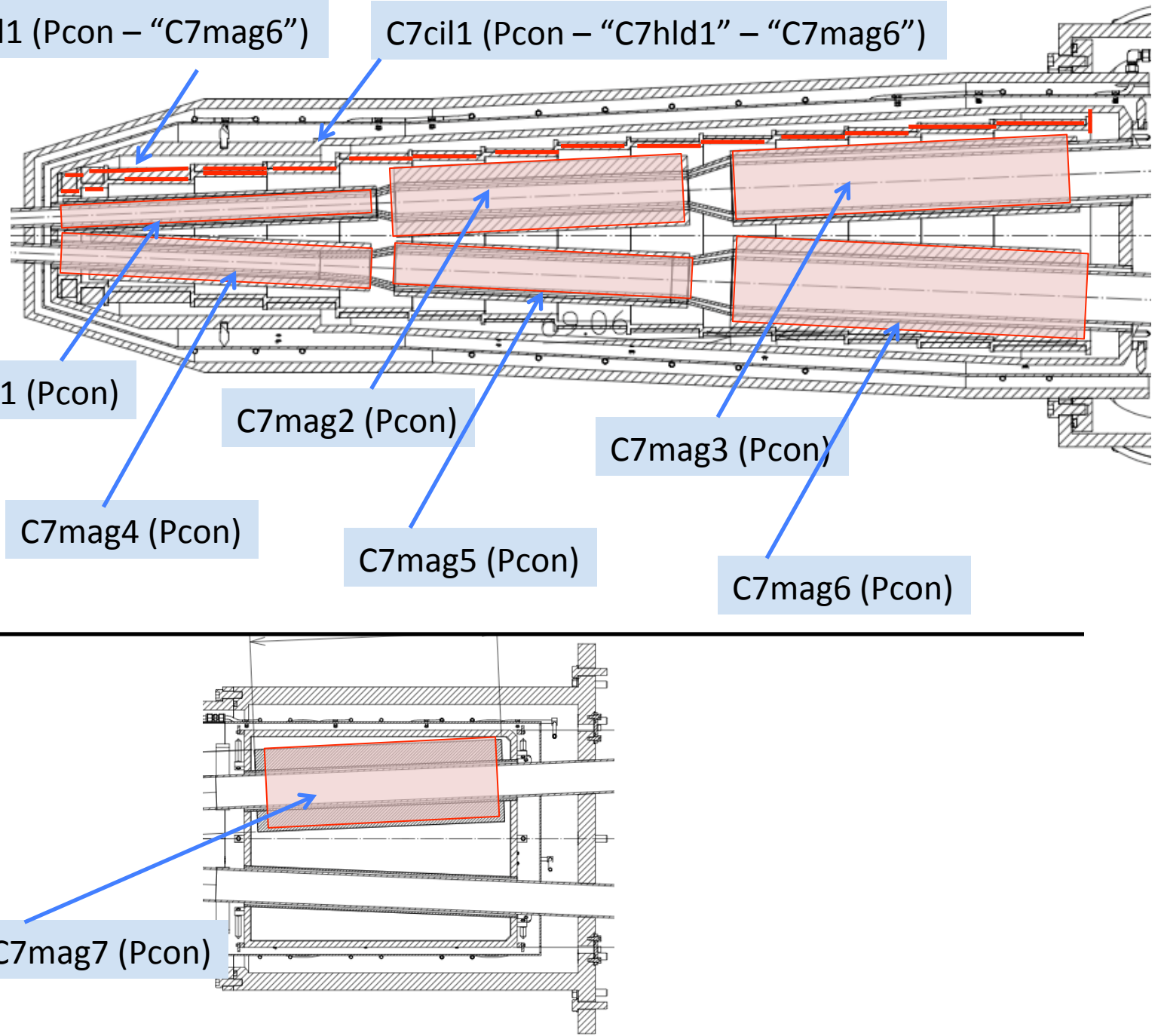
C7mag4 (Pcon)

C7mag5 (Pcon)

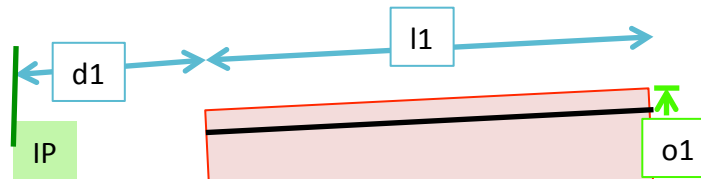C7mag6 (Pcon)

In C6spc6

C7mag7 (Pcon)

C7mag1 (Pcon * "A6spc3")

C7mag2 (Pcon * "A6spc3")

C7mag3 (Pcon * "A6spc3")
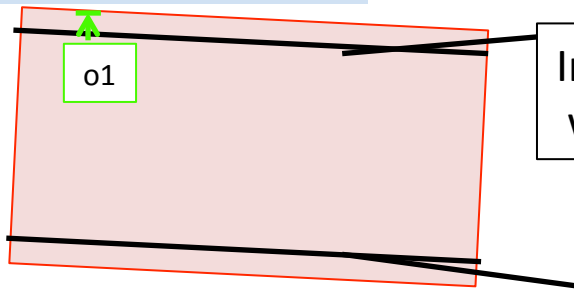
C7mag7 (Pcon * "A6spc4")

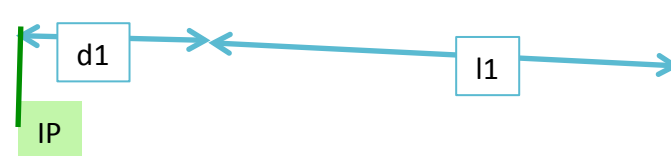Intersection with "A6spc4"

l1

d1

IP
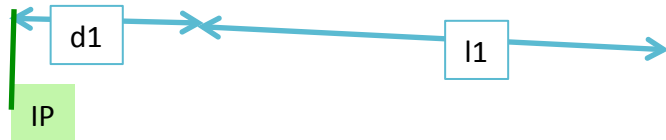
o1

Intersection with "A6spc3"

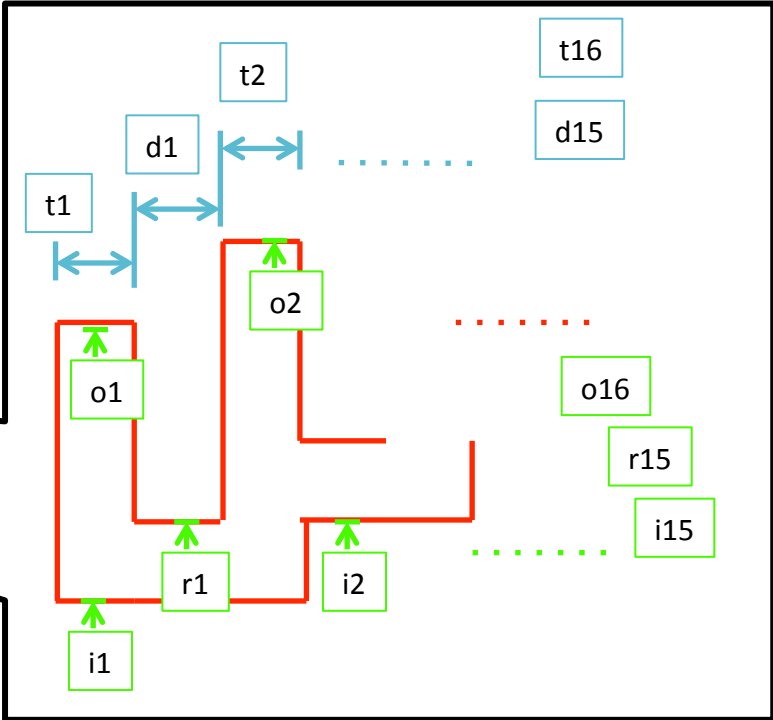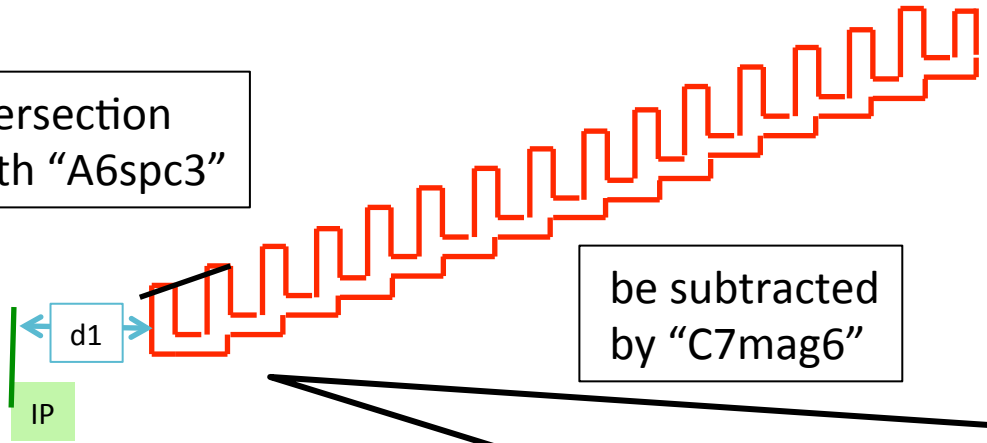C7mag4 (Pcon * "A6spc3")

C7mag5 (Pcon * "A6spc3")

C7mag6 (Pcon * "A6spc3")

o1

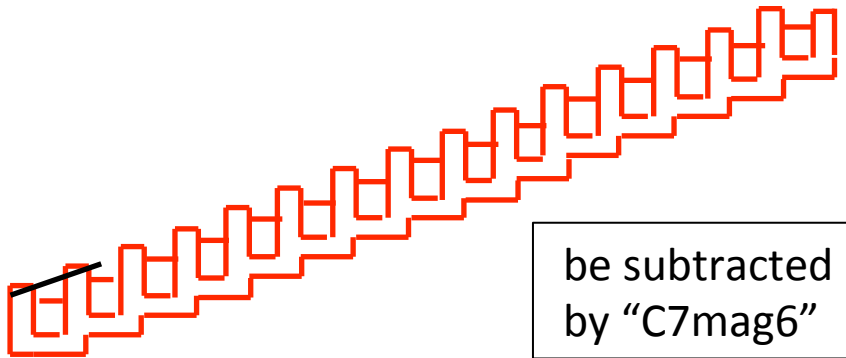Intersection with "A6spc3"

o1

d1

l1

IP

d1

l1

IP
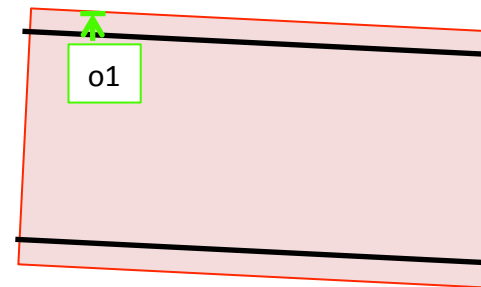
C7hld1 (Pcon * "A6spc3" – "C7mag6")

Intersection with "A6spc3"

be subtracted by "C7mag6"

C7cil1 ({Pcon – "C7hld1"} * "A6spc3" – "C7mag6")

Intersection with "A6spc3"

be subtracted by "C7mag6"
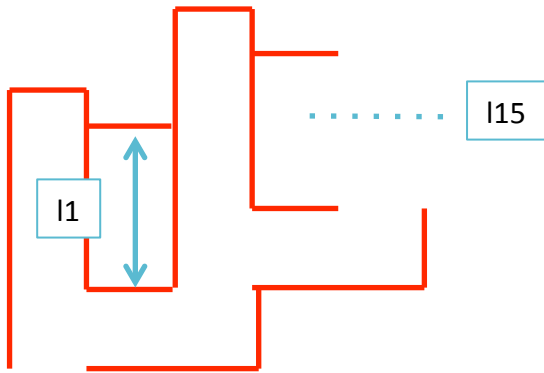
```cpp
TGeoCompositeShape* geoC7mag1 = new TGeoCompositeShape("geoC7mag1name","geoC7mag1pconname:rotHERname * geoC6spc3name");
TGeoVolume *volC7mag1 = new TGeoVolume("volC7mag1name", geoC7mag1, strMedC7mag1);

TGeoCompositeShape* geoC7mag2 = new TGeoCompositeShape("geoC7mag2name","geoC7mag2pconname:rotHERname * geoC6spc3name");
TGeoVolume *volC7mag2 = new TGeoVolume("volC7mag2name", geoC7mag2, strMedC7mag2);

TGeoCompositeShape* geoC7mag3 = new TGeoCompositeShape("geoC7mag3name","geoC7mag3pconname:rotHERname * geoC6spc3name");
TGeoVolume *volC7mag3 = new TGeoVolume("volC7mag3name", geoC7mag3, strMedC7mag3);

TGeoCompositeShape* geoC7mag4 = new TGeoCompositeShape("geoC7mag4name","geoC7mag4pconname:rotLERname * geoC6spc3name");
TGeoVolume *volC7mag4 = new TGeoVolume("volC7mag4name", geoC7mag4, strMedC7mag4);

TGeoCompositeShape* geoC7mag5 = new TGeoCompositeShape("geoC7mag5name","geoC7mag5pconname:rotLERname * geoC6spc3name");
TGeoVolume *volC7mag5 = new TGeoVolume("volC7mag5name", geoC7mag5, strMedC7mag5);

TGeoCompositeShape* geoC7mag6 = new TGeoCompositeShape("geoC7mag6name","geoC7mag6pconname:rotLERname * geoC6spc3name");
TGeoVolume *volC7mag6 = new TGeoVolume("volC7mag6name", geoC7mag6, strMedC7mag6);

TGeoCompositeShape* geoC7mag7 = new TGeoCompositeShape("geoC7mag7name","geoC7mag7pconname:rotHERname * geoC6spc6name");
TGeoVolume *volC7mag7 = new TGeoVolume("volC7mag7name", geoC7mag7, strMedC7mag7);
```
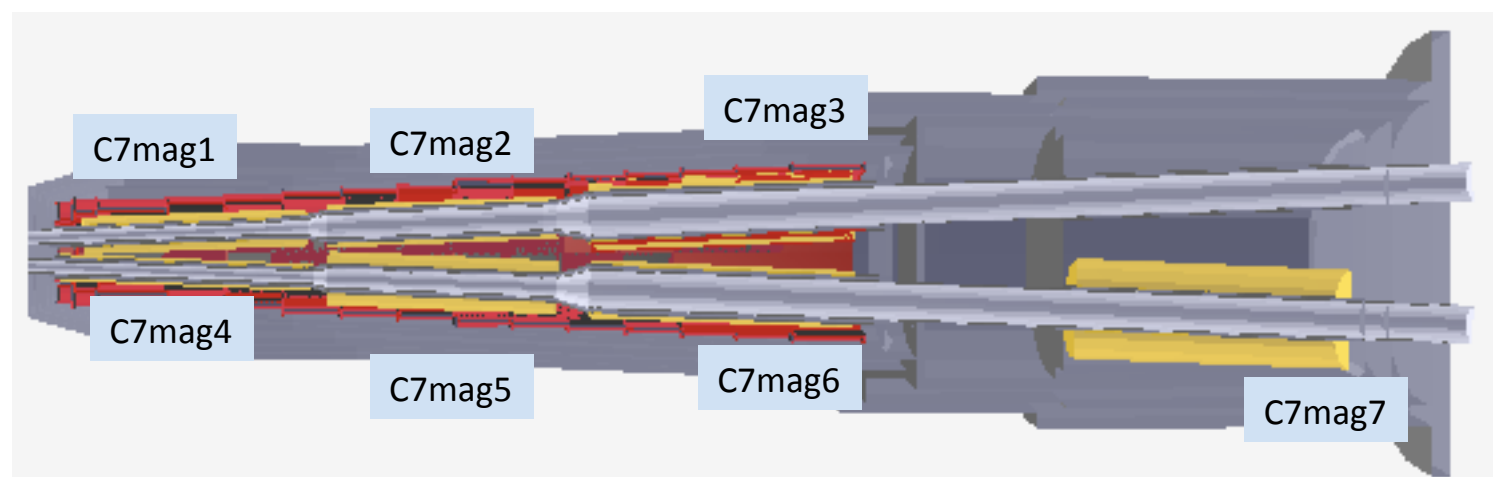
```cpp
TGeoCompositeShape* geoC7hld1 = new TGeoCompositeShape("geoC7hld1name","(geoC7hld1pconname * geoC6spc3name) - geoC7mag6name");
TGeoVolume *volC7hld1 = new TGeoVolume("volC7hld1name", geoC7hld1, strMedC7hld1);


TGeoCompositeShape* geoC7cil1 = new TGeoCompositeShape("geoC7cil1name","((geoC7cil1pconname - geoC7hld1name) * geoC6spc3name) - geoC7mag6name");
TGeoVolume *volC7cil1 = new TGeoVolume("volC7cil1name", geoC7cil1, strMedC7cil1);
```