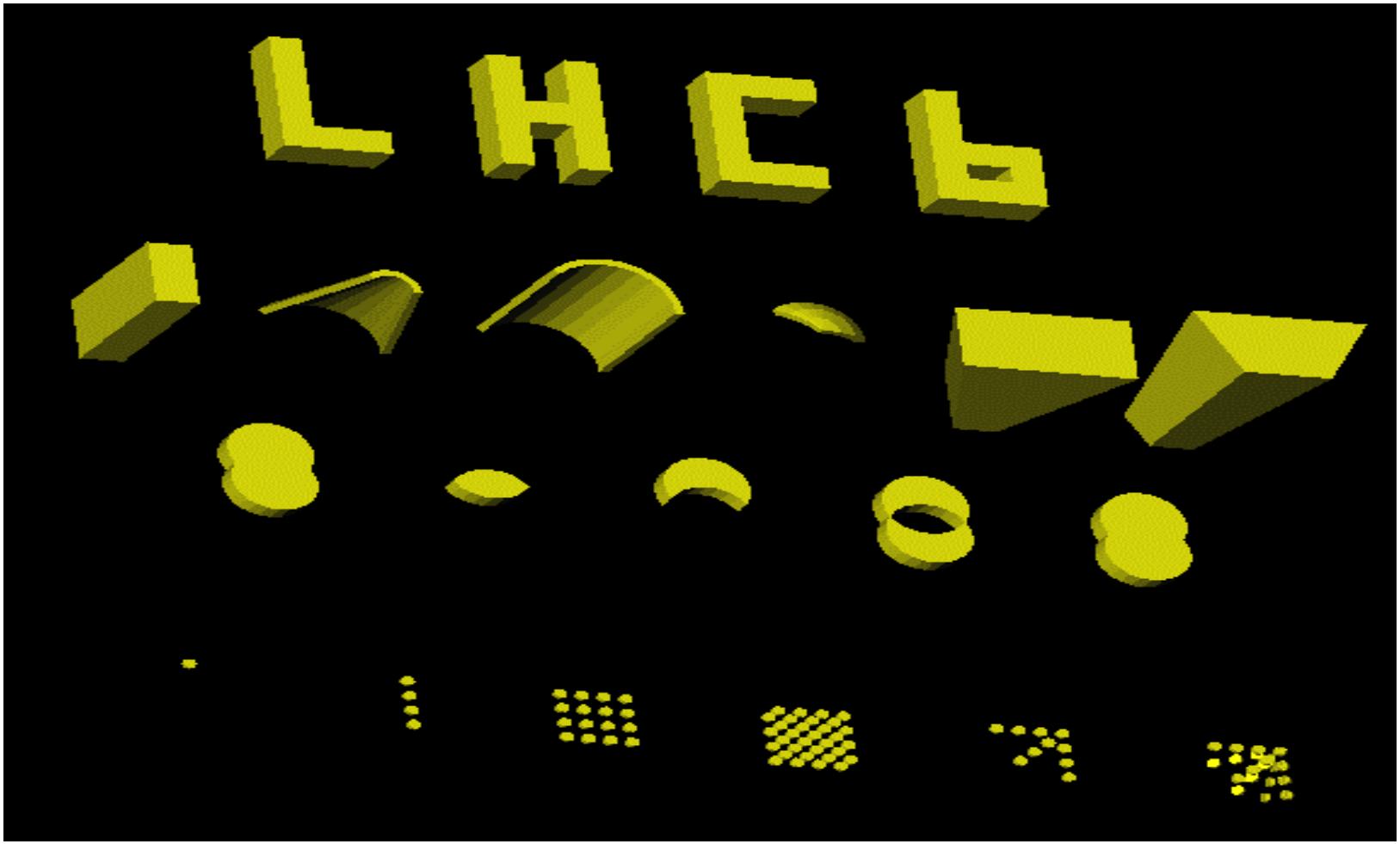
Detector description language news



Topics

- News of the geometry
  - No more need for default attributes
  - Transformations
    - Usage
    - Composition
  - Boolean solids
  - Parametrized volumes
  - Trapezoids
- News of detector elements
  - userParameter and userParameterVector
- Done / To do list

Default values for attributes

- Null or default values are no more needed inside xml
- These are mostly :
  - 0*m for every dimension
  - 0*degree for every angle
  - 360*degree for deltaPhiAngle
  - 180*degree for deltaThetaAngle

```
<tubs name="..."
        sizeZ = "1*m"
        innerRadius = "0*m"
              outerRadius = "1*m"
              startPhiAngle="0*degree"
              deltaPhiAngle="360*phi"/>
<posXYZ x="0*m"
              y="1*m"
              z="0*m"/>
```

Old Way

```
<tubs name="..."
        sizeZ = "1*m"
        outerRadius = "1*m"/>
      <posXYZ y="1*m"/>
```

New Way

Usage of the transformations

- No more inside solids but outside
- Accepted after every solid (even first one in booleans)
- Give position first, rotation afterwards. rotation is applied first.

```
<subtraction name="L">
  <box .../>
  <box ...>
    <posXYZ .../>
  </box>
</subtraction>
```

Old Way

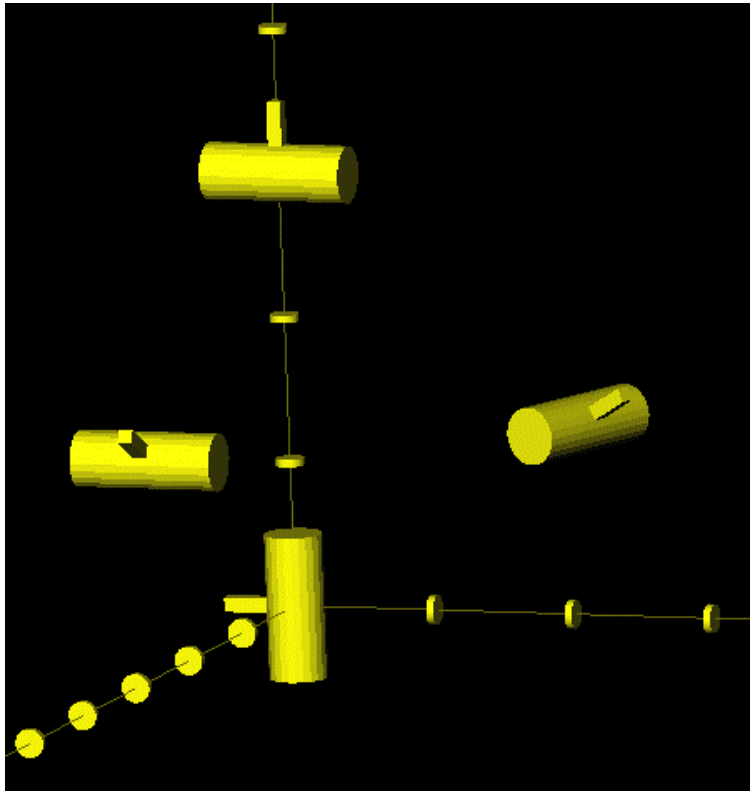
```
<subtraction name="L">
  <box .../>
  <!-- I can put pos and rot here -->
  <box .../>
  <posXYZ .../>
</subtraction>
```

New Way

Composition of transformations

- A new tag : <transformation>
- No attributes, as many children as you want
- It just applies the transformation in the order they are given

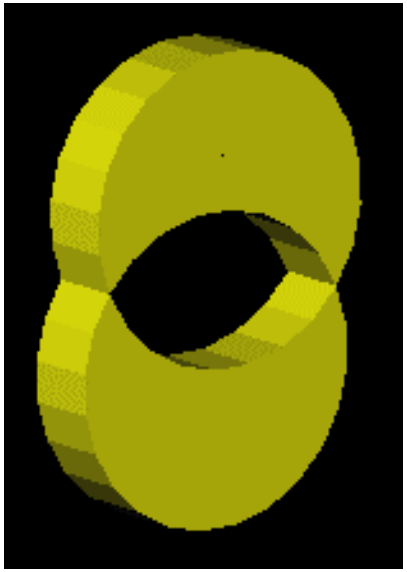
```
<transformation>
  <pos ...>                    | 1st
  <rot ...>
  <transformation>
    <pos ...>                  | 2nd
    <rot ...>
    <pos ...>                  | 3rd
  </transformation>
</transformation>
```



Composition of boolean operations

- Nothing new but a recursive behavior of booleans.

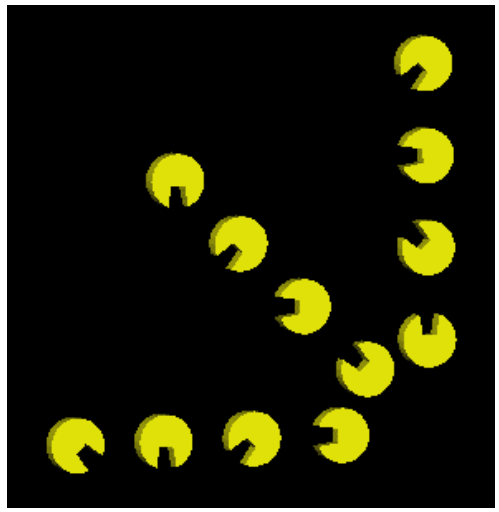
```
<subtraction name="...">
  <union name="...">
    <tubs .../>
    <tubs .../>
    <posXYZ .../>
  </union>
  <intersection name="...">
    <tubs .../>
    <tubs .../>
    <posXYZ .../>
  </intersection>
</subtraction>
```

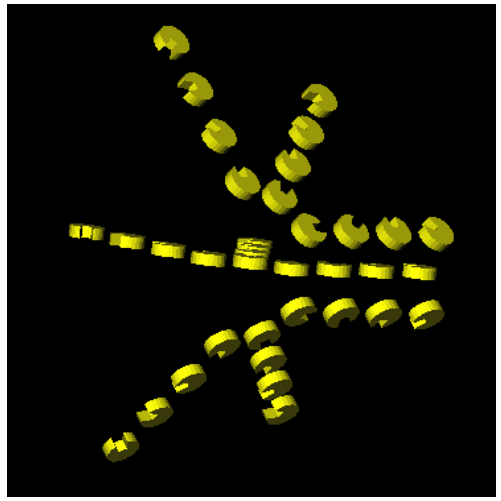


Composition of parametrizations

- Nothing new but a recursive behavior of parametrization.

```
<logvol ... name="ppv">
  <paramphysvol number="4">
    <physvol ... logvol=".../vol"/>
    <posXYZ y="1*m"/>
    <rotXYZ rotZ="45*degree"/>
  </paramphysvol>
</logvol>
<logvol ... name="pppv">
  <paramphysvol number="3">
    <physvol nam... logvol=".../ppv"/>
    <posXYZ/>
    <rotXYZ rotZ="45*degree"/>
  </paramphysvol>
</logvol>
```

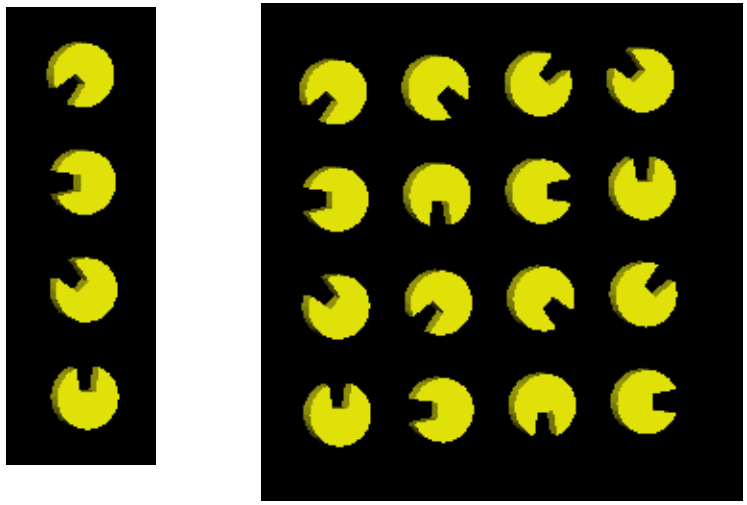




2D and 3D parametrizations

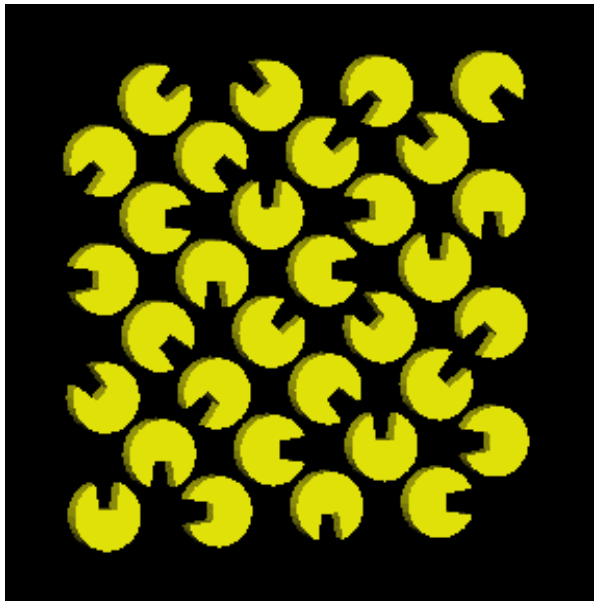
- New tags : <paramphysvol2D> and <paramphysvol3D>
- Special behavior, different from composition
  - All rotations applied first
  - Positionning done at the end
- The results are "grids"

```
<logvol ... name="ppv2D">
  <paramphysvol2D number1="4"
                  number2="4">
    <physvol ... logvol=".../vol"/>
    <posXYZ y="1*m"/>
    <rotXYZ rotZ="45*degree"/>
    <posXYZ x="1*m"/>
    <rotXYZ rotZ="90*degree"/>
  </paramphysvol2D>
</logvol>
```



Example of 3D parametrization

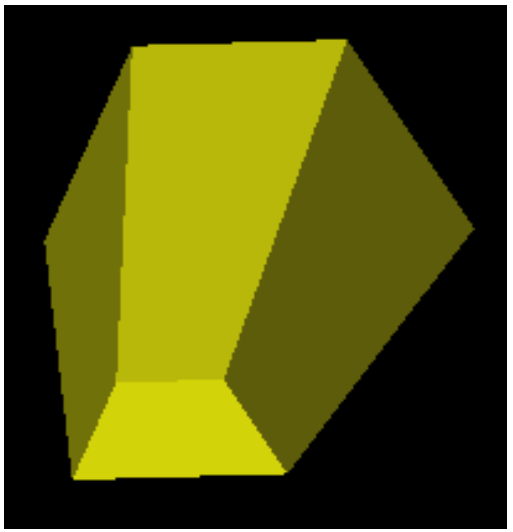
```
<logvol ... name="ppv3D">
  <paramphysvol3D number1="4"
                  number2="4"
                  number3="2">
    <physvol ... logvol=".../vol"/>
    <posXYZ y="1*m"/>
    <rotXYZ rotZ="45*degree"/>
    <posXYZ x="1*m"/>
    <rotXYZ rotZ="90*degree"/>
    <posXYZ x=".5*m" y=".5*m"/>
    <rotXYZ rotZ="180*degree"/>
  </paramphysvol3D>
</logvol>
```



General trapezoids

- New tag : <trap> with lots of attributes : name, sizeZ, theta, phi, sizeY1, sizeX1, sizeX2, alp1, sizeY2, sizeX3, sizeX4, alp2.
- This is exactly the geant general trapezoid.

```
<trap name="trap_sample"
      sizeZ="12*m"
      theta="0*degree"
      phi="0*degree"
      sizeY1="2*m"
      sizeX1="2*m"
      sizeX2="4*m"
      alp1="0*degree"
      sizeY2="4*m"
      sizeX3="4*m"
      sizeX4="8*m"
      alp2="0*degree"/>
```



userParameter / userParameterVector

- Two new tags : <userParameter> and <userParameterVector>
- Attributes are name, type and comment. All these are strings.
- The value is given directly between opening and closing tags.
- It is accessible in regular interface IdetectorElement via methods userParameterType, userParameterComment, userParameterValue, userParameter (see next talk)

```
<userParameter
      name="Al_plate_thickness"
      type="double"
      comment="blabla">
  1.2222*mm
</userParameter>
```

```
<userParameterVector
      name="Al_plate_thickness"
      type="double"
      comment="blabla">
  1.222*m  1.333*m
  1.444*m  1.555*m
</userParameterVector>
```

To be done / discussed

- Concerning geometry
  - Test general trapezoids
  - Discuss the memory problem for parametrized physical volumes
  - Be able to reload xml in GaudiLab (most of the work in DetDesc)
  - Usage of a transformation for the first solid in a boolean
  - Compile and test everything under windows
  - Problems with GaudiLab (stability, boolean operations, ...)
- Concerning structure
  - Discuss the scope of the <parameter> tag
  - Improve the <userParam(Vector)> tag