

---

# **Geant 4 EIC Documentation**

***Release 0.00.01***

**Yulia Furletova, Dmitry Romanov**

**May 19, 2021**



**FILE FORMATS:**

<b>1</b>	<b>LUND format</b>	<b>1</b>
<b>2</b>	<b>Beagle file format</b>	<b>5</b>
<b>3</b>	<b>C++ development</b>	<b>7</b>
3.1	Developing with VSCode . . . . .	7
3.2	PODio . . . . .	7
<b>4</b>	<b>Python development</b>	<b>9</b>



## LUND FORMAT

Ascii format from Pythia6 and other

<https://eic.github.io/software/pythia6.html>

Example:

```
=====
      19 .54218E-03 .33589E-01 .62798E+02 .10000E+01 .12907E+00 .48249E-01 .
→42839E+02 .84490E-03 .60604E+00
      1  -1   0      11      3      4      0.000000      0.000000      -4.
→000000      4.000000      0.000510      0.000000      0.000000      0.000000
      2   1   0      2212     5      0      -1.499375      0.000000      29.
→962508      30.014669      0.938270      0.000000      0.000000      0.000000
      3  -1   0      11      0      0      0.090461      0.145091      -3.
→479375      3.483574      0.000510      0.000000      0.000000      0.000000
      4   0   0      22      0      0      -0.090461      -0.145091      -0.
→520625      0.516426      -0.183272      0.000000      0.000000      0.000000
      5   1   0      2212     0      0      -1.499375      -0.000000      29.
→962508      30.014669      0.938270      0.000000      0.000000      0.000000
      6   0   1      22      0      0      -0.091770      -0.147153      -0.
→527567      0.524227      -0.183272      0.000000      0.000000      0.000000
      7   0   0      2      0      0      -0.000801      0.000001      0.
→016027      0.016047      0.000000      0.000000      0.000000      0.000000
      8   0   1      22      0      0      -0.091770      -0.147153      -0.
→527567      0.524227      -0.183272      0.000000      0.000000      0.000000
      9   0   0      2      0      0      -0.000801      0.000001      0.
→016027      0.016047      0.000000      0.000000      0.000000      0.000000
     10   0   0      2      0      0      -0.092571      -0.147152      -0.
→511540      0.540274      0.000000      0.000000      0.000000      0.000000
     11   1   0      2214     15     16      -1.334056      -0.070980      27.
→245608      27.307794      1.267957      0.000000      0.000000      0.000000
     12  -1   1      11      0      0      0.090461      0.145091      -3.
→479375      3.483574      0.000510      0.000000      0.000000      0.000000
     13   0   0      2      18     19      0.015950      0.082254      -0.
→490823      0.497923      0.000000      0.000000      0.000000      0.000000
     14   0   0      2      18     19      -0.271731      -0.156364      2.
→687099      2.725378      0.330000      0.000000      0.000000      0.000000
     15   0   1      2112     0      0      -1.248272      -0.078841      20.
→276378      20.336635      0.939570      0.000000      0.000000      0.000000
     16   1   1      211      0      0      -0.085783      0.007860      6.
→969229      6.971159      0.139570      0.000000      0.000000      0.000000
     17   0   0      92      18     19      -0.255781      -0.074111      2.
→196276      3.223301      2.344169      0.000000      0.000000      0.000000
(continues on next page)
```

(continued from previous page)

18	-1	1	211	0	0	-0.138794	0.051058	-0.
→488663			0.529284	0.139570		0.000000	0.000000	0.000000
19	1	1	211	0	0	-0.116987	-0.125169	2.
→684938			2.694017	0.139570		0.000000	0.000000	0.000000
27			.14537E-06	.23710E-05	.17191E+02	.10000E+01	.33980E-01	.17737E-04
→61009E+02			.48382E-02	.66654E+00				
1	-1	0	11	3	4	0.000000	0.000000	-4.
→000000			4.000000	0.000510		0.000000	0.000000	0.000000
2	1	0	2212	5	0	-1.499375	0.000000	29.
→962508			30.014669	0.938270		0.000000	0.000000	0.000000
3	-1	0	11	0	0	0.001265	-0.000830	-3.
→864046			3.864047	0.000510		0.000000	0.000000	0.000000
4	0	0	22	0	0	-0.001265	0.000830	-0.
→135954			0.135953	-0.001540		0.000000	0.000000	0.000000
5	1	0	2212	0	0	-1.499375	0.000000	29.
→962508			30.014669	0.938270		0.000000	0.000000	0.000000
6	0	0	21	0	0	0.000000	0.000000	0.
→000000			0.000000	0.000000		0.000000	0.000000	0.000000
7	0	0	21	0	0	0.000000	0.000000	0.
→000000			0.000000	0.000000		0.000000	0.000000	0.000000
8	0	0	21	0	0	0.000000	0.000000	0.
→000000			0.000000	0.000000		0.000000	0.000000	0.000000
9	0	0	21	0	0	0.000000	0.000000	0.
→000000			0.000000	0.000000		0.000000	0.000000	0.000000
10	0	0	21	0	0	0.000000	0.000000	0.
→000000			0.000000	0.000000		0.000000	0.000000	0.000000
11	0	0	21	0	0	0.000000	0.000000	0.
→000000			0.000000	0.000000		0.000000	0.000000	0.000000
12	-1	1	11	0	0	0.001265	-0.000830	-3.
→864046			3.864047	0.000510		0.000000	0.000000	0.000000
13	0	0	1	21	22	0.331746	0.109659	0.
→657833			0.814693	0.330000		0.000000	0.000000	0.000000
14	0	0	2	21	22	-0.105371	0.166763	8.
→252196			8.261147	0.330000		0.000000	0.000000	0.000000
15	0	0	1	18	19	-0.444255	-0.108866	1.
→436443			1.543206	0.330000		0.000000	0.000000	0.000000
16	0	0	2101	18	19	-1.282760	-0.166726	19.
→480082			19.531577	0.579330		0.000000	0.000000	0.000000
17	0	0	91	18	19	-1.727015	-0.275592	20.
→916526			21.074783	1.893908		0.000000	0.000000	0.000000
18	1	1	2212	0	0	-0.775992	-0.376113	16.
→716245			16.764749	0.938270		0.000000	0.000000	0.000000
19	-1	1	211	0	0	-0.951023	0.100522	4.
→200281			4.310034	0.139570		0.000000	0.000000	0.000000
20	0	0	92	21	22	0.226375	0.276422	8.
→910028			9.075840	1.689557		0.000000	0.000000	0.000000
21	1	1	211	0	0	-0.289003	0.688893	2.
→632555			2.740059	0.139570		0.000000	0.000000	0.000000
22	0	0	221	23	25	0.515378	-0.412471	6.
→277473			6.335781	0.547450		0.000000	0.000000	0.000000
23	-1	1	211	0	0	0.107928	-0.108095	1.
→203142			1.220804	0.139570		0.000000	0.000000	0.000000

(continues on next page)

(continued from previous page)

24	1	1	211	0	0	0.248541	-0.016819	2.
→026567			2.046585	0.139570		0.000000	0.000000	0.000000
25	0	0	111	26	27	0.158909	-0.287557	3.
→047764			3.068391	0.134980		0.000000	0.000000	0.000000
26	0	1	22	0	0	0.102482	-0.201297	1.
→468895			1.486162	0.000000		0.000004	-0.000006	0.000000
27	0	1	22	0	0	0.056427	-0.086260	1.
→578869			1.582230	0.000000		0.000004	-0.000006	0.000000
=====								





## BEAGLE FILE FORMAT

<https://wiki.bnl.gov/eic/index.php/BeAGLE>



## C++ DEVELOPMENT

For unit testing Catch2 unit test framework is used:

- <https://github.com/catchorg/Catch2>
- <https://github.com/catchorg/Catch2/blob/devel/docs/tutorial.md#top>

### 3.1 Developing with VSCode

Install plugins:

- <https://code.visualstudio.com/docs/languages/cpp>
- CMake
- CMake Tools
- reStructuredText (for documentation)

Point to CMakeLists.txt in cpp directory

### 3.2 PODio

To regenerate all PODio classes:

```
# From the project root
python cpp/podio/v00-13/python/podio_class_generator.py ../examples/datalayout.
→yaml cpp/eicmcio/podio data ROOT
```



**PYTHON DEVELOPMENT**