

Towards a Les Houches Events file format?

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The (original) **Les Houches Accord (LHA)**

E. Boos et al.,

in proceedings of the Workshop on Physics at TeV Colliders,
Les Houches, France, 21 May – 1 June 2001, [hep-ph/0109068](https://arxiv.org/abs/hep-ph/0109068)

has been immensely successful for transferring information
matrix-element-generators \implies **general-purpose generators**.

Standard specified in terms of two **Fortran commonblocks**,
HEPRUP and HEPEUP.

Most usage in terms of **files** with stored events rather than commonblock.

C++ generators will not even want to use Fortran commonblocks.

Can we agree on a standard file format?

Discussed at two LCG Generator meetings during the workshop.

(+ Private discussions/e-mail.)

Proposed minimal information content

Omitting blank lines, and lines beginning with an < or #, the file should contain *exactly* the LHA information, split across lines as follows:

1) Initialization information, given once

a) one line with process-number-independent information:

IDBMUP(1) IDBMUP(2) EBMUP(1) EBMUP(2) PDFGUP(1) PDFGUP(2) ↷

↶ PDFSUP(1) PDFSUP(2) IDWTUP NPRUP

b) NPRUP lines, one for each process IPR in the range 1 - NPRUP:

XSECUP(IPR) XERRUP(IPR) XMAXUP(IPR) LPRUP(IPR)

2) Event information, repeated as many times as there are events

a) one line with common event information:

NUP IDPRUP XWGTUP SCALUP AQEDUP AQCDUP

b) NUP lines, one for each particle I in the range 1 - NUP

IDUP(I) ISTUP(I) MOTHUP(1,I) MOTHUP(2,I) ICOLUP(1,I) ICOLUP(2,I) ↷

↶ PUP(1,I) PUP(2,I) PUP(3,I) PUP(4,I) PUP(5,I) VTIMUP(I) SPINUP(I)

Always blank-separated fields, with no variables omitted (but can be brief)

Proposed document structure

```
<LesHouchesEvents version="1.0">
# comment lines can go here
<header>
<!-- only xml tags in this section, including for comments -->
</header>
# further comments allowed between blocks
<init>
initialization information, as described previously
# further comments on initialization, freely interspersed
</init>
# further comments allowed between blocks
<events>
event information, as described previously
# further comments for each event, freely interspersed
</events>
</LesHouchesEvents>
```

Alternative document structure

```
<LesHouchesEvents version="1.0">
# comment lines can go here
<header>
<!-- only xml tags in this section, including for comments -->
</header>
# further comments allowed between blocks
<init>
initialization information, as described previously
# further comments on initialization, after compulsory part
</init>
# further comments allowed between blocks
<events>
<newevent/>
event information, as described previously
# further comments for each event, after compulsory part
<newevent/>
...
</events>
</LesHouchesEvents>
```

Further comments

- Allows but does not enforce sophisticated `xml` structure
⇒ natural slow learning/upgrade path.
- Allows “oldfashioned” plaintext comments/info with `#`.
- Beginning of document should describe event sample (generator, process, cuts, ...) in enough detail to reproduce what was done.
- Header block optional?
- Skip lines inside header block for required LHA info parsing, since they need not begin with a `<?`
- Omit energy if needs to save space?
- Provide examples of Fortran and C++ parsers?
- Recommended form for some extensions, e.g.:
`#pdf id1 id2 x1 x2 scalePDF xpdf1 xpdf2 ?`
- ...

The way forward

- A new mail will be sent to whole `mc41hc-06@cern.ch` list.
- People can then sign up for continued discussion in new list `project-lhafile@cern.ch` ; to register go to <http://listboxservices.web.cern.ch/listboxservices/> .
- Try to converge on version 1.0 within next month or two.
- This text sent also to `mc41hc-06@cern.ch` for final approval.
- Work/discussions on 2.0 should only start thereafter.
- In first round further `xml` tags could be optional.
Then up to `xml` enthusiasts to show that more enforced `xml` can provide an advantage to users.