# physml.sty: An Infrastructure for Marking Up PhysML in TEX/IATEX\*

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#### Abstract

The <code>physml</code> package allows mark up PhysML structures in LATEX documents that can be harvested by automated tools or exported to PDF, while at the same time generating conventional title information.

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<sup>\*</sup>Version ? (last revised ?)

# 1 Introduction

The physml package is part of the STEX project (see [Ste; Koh08]) and extends STEX with an infrastructure for creating PhysML markup [Phy; HKS06] from LATEX sources.

## 2 The User Interface

EdNote(1)

1

## 2.1 Package Options

showmeta

The physml package takes a single option: showmeta. If this is set, then the metadata keys are shown (see [Kohlhase:metakeys:ctan] for details and customization options).

- 2.2 Observables
- 2.3 Systems
- 2.4 Values
- 2.5 Experiments

<sup>&</sup>lt;sup>1</sup>EdNote: document the functionality here

## 3 The Implementation

The sref package generates two files: the LATEX package (all the code between <code><\*package</code>) and <code></package</code>) and the LATEXML bindings (between <code><\*ltxml</code>) and <code></ltxml</code>). We keep the corresponding code fragments together, since the documentation applies to both of them and to prevent them from getting out of sync.

We first set up header information for the LATEXML binding file.

```
1 \*Itxml\>
2 package LaTeXML::Package::Pool;
3 use strict;
4 use LaTeXML::Package;
5 \/Itxml\>
```

### 3.1 Package Options

We declare some switches which will modify the behavior according to the package options. Generally, an option xxx will just set the appropriate switches to true (otherwise they stay false).<sup>2</sup>

```
6 \*package\
7 \DeclareOption{showmeta}{\PassOptionsToPackage{\CurrentOption}{metakeys}}
8 \ProcessOptions
9 \/package\
10 \*package\
11 \RequirePackage{sref}
12 \/package\
```

13 (package)\newcommand{\physml}{PhysML}

#### 3.2 Observables

```
observable
```

physml

```
14 (*package)
15 \srefaddidkey{obs}
16 \addmetakey{obs}{algebra}
17 \newenvironment{observable}[1][]% keyword args
18 {\metasetkeys{obs}{#1}{\bf{Observable (\obs@id):}}\begin{description}}
19 {\end{description}}
20 (/package)
21 (*ltxml)
22 DefKeyVal('obs', 'name', 'Semiverbatim');
23 DefKeyVal('obs', 'algebra', 'Semiverbatim');
24 DefEnvironment('{observable} OptionalKeyVals:obs',
         "<omdoc:observable name='&KeyVal(#1,'name')'"
25
                             "?&defined(&KeyVal(#1,'algebra'))(algebra='&KeyVal(#1,'algebra')')()>
26
           "#body"
```

EdNote(2)

 $<sup>^2\</sup>mathrm{EdNote}\colon$  need an implementation for  $\mathrm{LaTeXML}$ 

```
. "</omdoc:observable>\n");
            29 (/ltxml)
            30 (*package)
            31 \newcommand{\obsref}[1]{ref: #1}
            32 (/package)
            33 (*ltxml)
            34 DefConstructor('\obsref{}', "<omdoc:observable xref='#1'/>");
            35 (/ltxml)
refinement
            36 (*package)
            37 \srefaddidkey{refinement}
            38 \newenvironment{refinement}[1][]{\item[Refinement]}{}
            39 (/package)
            40 \langle *ltxml \rangle
            41 DefKeyVal('refinement','id','Semiverbatim');
            42 DefEnvironment('{refinement} OptionalKeyVals:refinement',
                      "<omdoc:refinement ?&defined(&KeyVal(#1,'id))(xml:id='&KeyVal(#1,'id')')()>"
            44
                    . "#body"
                    . "</omdoc:refinement>\n");
            45
            46 (/ltxml)
     opdef
            47 (*package)
            48 \newenvironment{opdef}[1][]{\item[Opdef:]}{}
            49 (/package)
            50 (*ltxml)
            51 DefKeyVal('opdef,'id','Semiverbatim');
            52 DefEnvironment('{opdef} OptionalKeyVals:opdef',
                      "<omdoc:opdef ?&defined(&KeyVal(#1,'id))(xml:id='&KeyVal(#1,'id')')()>"
            53
                    . "#body"
            54
                    . "</omdoc:opdef>\n");
            56 (/ltxml)
            3.3 Systems
    system
            57 (*package)
            58 \srefaddidkey{system}
            59 \newenvironment{system}[1][]% keyword args
            60 {\metasetkeys{system}{#1}{\bf{System (\system@id):}}\begin{description}}
            61 {\end{description}}
            62 (/package)
            63 (*ltxml)
            64 DefKeyVal('system,'id','Semiverbatim');
            65 DefEnvironment('{system} OptionalKeyVals:id',
                      "<omdoc:system ?&defined(&KeyVal(#1,'id))(xml:id='&KeyVal(#1,'id)')()>"
            66
                    . "#body"
```

67

```
. "</omdoc:system>\n");
                                   69 \langle /ltxml \rangle
                                   70 (*package)
                                   71 \newcommand{\sysref}[1]{ref: #1}
                                   72 (/package)
                                   73 (*ltxml)
                                   74 (/ltxml)
realization
                                   75 (*package)
                                   76 \newenvironment{realization}[1][]{\item[Realization]}{}
                                   77 (/package)
                                   78 (*ltxml)
                                   79 DefKeyVal('realization,'id','Semiverbatim');
                                   80 DefEnvironment('{realization} OptionalKeyVals:realization,
                                                            "<omdoc:realization ?&defined(&KeyVal(#1,'id))(xml:id='&KeyVal(#1,'id')')()>"
                                                       . "#body"
                                                       . "</omdoc:realization>\n");
                                   84 \langle /ltxml \rangle
preparation
                                   85 (*package)
                                   86 \label{lem:preparation} \end{area} \begin{subarray}{l} \end{subarray} \begin{suba
                                   87 (/package)
                                   88 (*ltxml)
                                   89 DefKeyVal('preparation,'id','Semiverbatim');
                                   90 DefEnvironment('{preparation} OptionalKeyVals:preparation',
                                                             "<omdoc:preparation ?&defined(&KeyVal(#1,'id))(xml:id='&KeyVal(#1,'id')')()>"
                                                       . "#body"
                                   92
                                                       . "</omdoc:preparation>\n");
                                   93
                                   94 (/ltxml)
                state
                                   95 (*package)
                                   96 \srefaddidkey{state}
                                   97 \addmetakey{state}{of}
                                   98 \newenvironment{state}[1][]% keyword args
                                   99 {{\bf{State:}}}{\par\noindent}
                                 100 \langle /package \rangle
                                 101 (*ltxml)
                                102 DefKeyVal('state','id','Semiverbatim');
                                103 DefKeyVal('state','of','Semiverbatim');
                                104 DefEnvironment('{state} OptionalKeyVals:state',
                                105
                                                             "<omdoc:state ?&defined(&KeyVal(#1,'id))(xml:id='&KeyVal(#1,'id)')()"
                                106
                                                                                                "?&defined(&KeyVal(#1,'of))(of='&KeyVal(#1,'of)')()>"
                                107
                                                                  "#body"
```

EdNote(3)

 $<sup>^3\</sup>mathrm{EdNote}$ : need to implement this in LaTeXML

```
108 . "</omdoc:state>\n"); 109 \ \langle / | txml \rangle 3.4 Values
```

#### statevalue

```
110 (*package)
111 \newcommand{\statevalue}[2]{{\tt{#1}}}\rightarrow{#2}}
112 % \srefaddidkey{value}
113 % \addmetakey{value}{for}
114 % \newenvironment{value}[1][]% keyword args
115 % {{\bf{Value:}}}{\par\noindent}
116 (/package)
117 (*ltxml)
118 DefKeyVal('value','id','Semiverbatim');
119 DefKeyVal('value','for','Semiverbatim');
120 DefEnvironment('{state} OptionalKeyVals:value',
           "<omdoc:value ?&defined(&KeyVal(#1,'id'))(xml:id='&KeyVal(#1,'id)')()"</pre>
121
                        "'?&defined(&KeyVal(#1,'for'))(for='&KeyVal(#1,'of)')()>"
122
            "#body"
        . "</omdoc:value>\n");
125 (/ltxml)
```

## 3.5 Experiments

```
measurement
```

```
126 (*package)
           127 \srefaddidkey{measurement}
           128 \newenvironment{measurement}[1][]% keyword args
           129 {{\bf{Measurement:}}}{\par\noindent}
           130 (/package)
           131 (*ltxml)
           132 DefKeyVal('measurement,'id','Semiverbatim');
           133 DefEnvironment('{measurement} OptionalKeyVals:measurement,
                      "<omdoc:measurement ?&defined(&KeyVal(#1,'id'))(xml:id='&KeyVal(#1,'id)')()>"
           134
                        "#bodv"
           135
                    . "</omdoc:measurement>\n");
           136
           137 (/ltxml)
experiment
           138 (*package)
           139 \srefaddidkey{experiment}
           140 \newenvironment{experiment}[1][]% keyword args
           141 {{\bf{Experiment:}}}{\par\noindent}
           142 (/package)
           143 (*ltxml)
           144 DefKeyVal('experiment,'id','Semiverbatim');
           145 DefEnvironment('{experiment} OptionalKeyVals:experiment,
                      "<omdoc:experiment ?&defined(&KeyVal(#1,'id'))(xml:id='&KeyVal(#1,'id)')()>"
           146
```

```
. "#body"
                147
                        . "</omdoc:experiment>\n");
                148
                149 (/ltxml)
      evidence
                150 (*package)
                151 \srefaddidkey{evidence}
                152 \newenvironment{evidence}[1][]% keyword args
                153 {{\bf{Evidence:}}}{\par\noindent}
                154 (/package)
                155 (*ltxml)
                156 DefKeyVal('evidence,'id','Semiverbatim');
                157 DefEnvironment('{evidence} OptionalKeyVals:evidence,
                          "<omdoc:evidence ?&defined(&KeyVal(#1,'id'))(xml:id='&KeyVal(#1,'id)')()>"
                        . "</omdoc:evidence>\n");
                160
                161 (/ltxml)
interpretation
                162 (*package)
                163 \srefaddidkey{interpretation}
                164 \newenvironment{interpretation}[1][]% keyword args
                165 {{\bf{Interpretation:}}}{\par\noindent}
                166 (/package)
                167 (*ltxml)
                168 DefKeyVal('interpretation,'id','Semiverbatim');
                169 DefEnvironment('{interpretation} OptionalKeyVals:interpretation,
                          "<omdoc:interpretation ?&defined(&KeyVal(#1,'id'))(xml:id='&KeyVal(#1,'id)')()>"
                171
                        . "#body"
                        . "</omdoc:interpretation>\n");
                172
                173 (/ltxml)
```

#### 3.6 Bookkeeping

We declare all tags as receiving xml:id and stex:sref attributes, pinpointing a unique identifier and their location in the LATEX source.

```
174 \*|txm|\)
175 Tag('omdoc:observable',afterOpen=>\&numberIt,afterClose=>\&locateIt);
176 Tag('omdoc:realization',afterOpen=>\&numberIt,afterClose=>\&locateIt);
177 Tag('omdoc:preparation',afterOpen=>\&numberIt,afterClose=>\&locateIt);
178 Tag('omdoc:state',afterOpen=>\&numberIt,afterClose=>\&locateIt);
179 Tag('omdoc:value',afterOpen=>\&numberIt,afterClose=>\&locateIt);
180 Tag('omdoc:measurement',afterOpen=>\&numberIt,afterClose=>\&locateIt);
181 Tag('omdoc:experiment',afterOpen=>\&numberIt,afterClose=>\&locateIt);
182 Tag('omdoc:evidence',afterOpen=>\&numberIt,afterClose=>\&locateIt);
183 Tag('omdoc:interpretation',afterOpen=>\&numberIt,afterClose=>\&locateIt);
184 Tag('omdoc:refinement',afterOpen=>\&numberIt,afterClose=>\&locateIt);
185 Tag('omdoc:opdef',afterOpen=>\&numberIt,afterClose=>\&locateIt);
186 Tag('omdoc:system',afterOpen=>\&numberIt,afterClose=>\&locateIt);
```

 $187 \langle /ltxml \rangle$ 

#### 3.7 Finale

Finally, we need to terminate the file with a success mark for perl.  $188 \langle \text{ltxml} \rangle 1$ ;

## References

- [HKS06] Eberhard Hilf, Michael Kohlhase, and Heinrich Stamerjohanns. "Capturing the Content of Physics: Systems, Observables, and Experiments". In: *Mathematical Knowledge Management, MKM'06*. Ed. by Jon Borwein and William M. Farmer. LNAI 4108. Springer Verlag, 2006, pp. 165–178. URL: http://kwarc.info/kohlhase/papers/mkm06physml.pdf.
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