Package yaslha Manual

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package yaslha for Python 3.5+

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Abstract

yaslha is an yet-another Python 3 package to handle SUSY Les Houches Accord (SLHA) files.

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1. Introduction

1.1. Background

SUSY Les Houches accord (SLHA) [1] is a data format widely used in particle physics community. It has been extended as SLHA2 [2] or flavor Les Houches accord (FLHA) [3]....

1.2. This Package

yaslha is an yet-another Python 3 package to handle SLHA data.

You can include this package in your Python code for more customization.... The appendices contain additional information of this package. Appendix A is the full API reference of this package.

2. Quick Start

2.1. Install and uninstall

This package requires Python 3.5 or above with pip package manager. You may check the versions by

```
$ python -V
Python 3.6.7
$ pip -V
pip 19.0.3
```

With the set-up, you can simply install this package via PyPI:

```
$ pip install yaslha  # to install
$ pip install --upgrade yaslha  # or to upgrade

Collecting yaslha
...
Successfully installed yaslha-(version)
```

You can also instantly uninstall this package by

```
$ pip uninstall yaslha
```

3. Conclusion

This paper introduces a Python 3 package "yaslha" to handle SLHA format, which can be installed via PyPI. ... (TBW)

This package is managed on GitHub: misho104/yaslha. Bug reports, comments, questions, and contribution are welcome on the website.

Acknowledgments

(To be written.)

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A. API Reference: yaslha

A.1. yaslha package

```
Package to handle SLHA-format files and data.

yaslha.parse(text, input_type='AUTO', parser=None, **kwargs)
    Parse a text to return an SLHA object.

yaslha.dump(slha, output_type='SLHA', dumper=None, **kwargs)
    Output a dumped string of an SLHA object.

yaslha.parse_file(path, **kwargs)
    Parse a file to return an SLHA object.

yaslha.dump_file(data, path, **kwargs)
    Write into a file a dumped string of an SLHA object.
```

A.2. yaslha.slha module

```
Module of SLHA object class.
```

```
class yaslha.slha.SLHA
Bases: object
SLHA object, representing a SLHA-format text.

add_block(obj: Union[Block, InfoBlock, Decay]) 
Add a block to SLHA file.

The name is automatically detected from the object.

__getitem__(key: Any) 
Get values of SLHA object or deeper.
```

SLHA[str] and SLHA[int] give the specified block and decay block, respectively. For ordinary blocks, further referencing is possible as SLHA[str, *key], while decay blocks refuse such referencing for safety.

```
get(*key, default: Any = None) → Any
    Return the value if exists, or default.
__setitem__(key: Any, value: Any) → None
    Set a value of SLHA object or deeper.
__delitem__(key: Any) → None
    Delete values of SLHA object or deeper.
normalize(blocks: bool = True, decays: bool = True) → None
    Normalize the head-lines so that names/pids match the dict keys.
merge(another: yaslha.slha.SLHA) → None
    Merge another SLHA data into this object.
```

A.3. yaslha.block module

```
Block-like object of SLHA data.
class yaslha.block.GenericBlock
      Bases: typing.Generic
      Block-like object containing comments.
      comment
            Give the interface to comments.
      classmethod new(obj: Union[int, str, yaslha.line.DecayHeadLine, yaslha.line.BlockHeadLine])
                         → Union[yaslha.block.Block, yaslha.block.InfoBlock, yaslha.block.Decay]
            Create a GenericBlock object according to the argument.
class yaslha.block.AbsBlock(obj: Union[yaslha.line.BlockHeadLine, str])
      Bases: yaslha.block.GenericBlock
      Abstract class for SLHA blocks.
            Return the name of block (always in upper case).
            Return the Q value.
      __getitem__(key: KT) \rightarrow Union[VT, Sequence[VT]]
            Return the value corresponding to the key.
      __setitem__(key: KT, value: VT) \rightarrow None
            Set the value for the key.
      __delitem__(key: KT) \rightarrow None
            Delete the value for the key.
      update\_line(line: LT) \rightarrow None
            Add the line to the block, overriding if exists.
      keys(sort: bool = False) \rightarrow Iterator[KT]
            Return the keys.
      __iter__(sort: bool = False) \rightarrow Iterator[KT]
            Return the keys.
      items(sort: bool = False) \rightarrow Iterator[Tuple[KT, VT]]
            Return (key, value) tuples.
class yaslha.block.Block(obj: Union[yaslha.line.BlockHeadLine, str])
      Bases: yaslha.block.AbsBlock
      SLHA block that has one value for one key.
      __getitem__(key: Union[None, int, Sequence[int]]) <math>\rightarrow float
            Return the value corresponding to the key.
      __setitem__(key: Union[None, int, Sequence[int]], value: float) → None
            Set the value for the key.
      __delitem__(key: Union[None, int, Sequence[int]]) <math>\rightarrow None
            Delete the value for the key.
```

```
update\_line(line: yaslha.line.ValueLine) \rightarrow None
             Add the line to the block, overriding if exists.
       merge(another: Union[yaslha.block.Block, yaslha.block.InfoBlock]) \rightarrow None
             Merge another block.
       get(*key, default: T) \rightarrow Union[float, T]
             Return the value for the key if exists, or default value.
       keys(sort: bool = False) \rightarrow Iterator[Union[None, int, Sequence[int]]]
             Return the keys.
       __iter__(sort: bool = False) \rightarrow Iterator[Union[None, int, Sequence[int]]]
             Return the keys.
       items(sort: bool = False) \rightarrow Iterator[Tuple[Union[None, int, Sequence[int]], float]]
             Return (key, value) tuples.
class yaslha.block.InfoBlock(obj: Union[yaslha.line.BlockHeadLine, str])
       Bases: yaslha.block.AbsBlock
       SLHA block that may have multiple values for one key.
       __getitem__(key: int) \rightarrow Sequence[str]
             Return the value corresponding to the key.
       __setitem__(key: int, value: Sequence[str]) \rightarrow None
             Set the value for the key.
       __delitem__(\mathit{key: int}) \rightarrow \mathit{None}
             Delete the value for the key.
       update\_line(line: yaslha.line.InfoLine) \rightarrow None
             Add the line to the block, overriding if exists.
       append\_line(line: yaslha.line.InfoLine) \rightarrow None
             Add the line, appending to the existing one if exists.
       append(key: int, value: str) \rightarrow None
             Append the value for the key.
       merge(another: Union[yaslha.block.Block, yaslha.block.InfoBlock]) \rightarrow None
             Merge another block.
       keys(sort: bool = False) \rightarrow Iterator[int]
             Return the keys.
       __iter__(sort: bool = False) \rightarrow Iterator[int]
             Return the keys.
       items(sort: bool = False) \rightarrow Iterator[Tuple[int, str]]
             Return (key, value) tuples.
class yaslha.block.Decay(obj: Union[yaslha.line.DecayHeadLine, int])
       Bases: yaslha.block.GenericBlock
       Decay block.
       br_normalize_threshold = 1e-06
       pid
             Return the pid of mother particle.
```

width

Return the total width.

 $update_line(line: yaslha.line.DecayLine) \rightarrow None$ Add the line to the block, overriding if exists.

Add the line to the block, overriding it exis

 $br(*key) \rightarrow float$

Return the BR of given channel.

 $partial_width(*key) \rightarrow float$

Return the width of given channel.

keys(sort: bool = False) \rightarrow Iterator[Sequence[int]] Return the keys.

__iter__(sort: bool = False) \rightarrow Iterator[Sequence[int]] Return the keys.

items_br(sort=False)

Return (key, BR) tuples, sorted by the BR.

items_partial_width(sort=False)

Return (key, width) tuples, sorted by the BR.

 $normalize(force: bool = False) \rightarrow None$

Normalize the branching ratios.

This method normalize all the branching ratios so that the sum becomes unity or less. In particular, if force is set True, they are normalized so that the sum becomes unity, regardless of the current value.

If force is False and the sum is less than one, the branching ratio is not normalized, assuming that some decay channels are not listed. If force is False and the sum slightly exceeds the unity, the branching ratios are normalized, while if the excess is larger than br_normalize_threshold, ValueError is raised.

```
\textbf{set\_partial\_width}(\textit{*args}) \rightarrow \textit{None}
```

Update the partial width and recalculate BRs of all channels.

 $remove(*key) \rightarrow None$

Remove the channel and recalculate BRs of all the other channels.

A.4. yaslha.comment module

Module of a class to handle comment interface.

```
class yaslha.comment.CommentInterface(block: GenericBlock[KTG, CT])
```

Bases: typing.Generic

Accessor object to the comments in blocks.

pre

Return pre-comment interface.

```
\begin{subarray}{ll} $\_\_\texttt{getitem}\_(\textit{key: Union[KTG, typing}\_\textit{extensions.Literal['head']]')} \to \textit{Union[CT, str]} \\ & \text{Return comment.} \end{subarray}
```

__setitem__(key: Union[KTG, typing_extensions.Literal['head']], value: Union[CT, str, None]) \rightarrow None Set comment.

A.5. yaslha.line module

Module to describe each type of lines.

The line hierarchy is given by:

- AbsLine BlockHeadLine DecayHeadLine InfoLine ValueLine
 - NoIndexLine
 - OneIndexLine
 - TwoIndexLine
 - ThreeIndexLine
 - DecayLine
 - CommentLine

class yaslha.line.LineOutputOption

Bases: object

Class to hold all the options on dumping lines.

```
class yaslha.line.AbsLine(**kwargs)
```

Bases: object

Abstract class for SLHA-line like objects.

```
output_option = <yaslha.line.LineOutputOption object>
```

 $\textbf{classmethod pattern()} \rightarrow \textit{Pattern[str]}$

Return a regexp pattern matching a SLHA line for the type.

 $\textbf{classmethod construct}(\textit{line: str}) \rightarrow \textit{Optional[LT]}$

Construct an object from a line if it maches the pattern.

to_slha(option: Optional[yaslha.line.LineOutputOption] = None) \rightarrow List[str] Return the lines for SLHA-format, including pre-comments.

 $\mathbf{dump}() \to \mathit{List[Union[str, float]]}$

Return a list representing the line.

```
classmethod from_dump(dump: Sequence[Any], **kw) \rightarrow LT
           Return an object from dumped value.
class yaslha.line.BlockHeadLine(name, q=None, comment=None)
      Bases: yaslha.line.AbsLine
      Line for block header.
      name
           Return name in upper case.
class yaslha.line.DecayHeadLine(pid:
                                         Union[str, int], width: Union[str, float], comment:
                                  Optional[str] = None)
      Bases: yaslha.line.AbsLine
      A line with format ('DECAY', 1x, I9, 3x, 1P, E16.8, 0P, 3x, '#', 1x, A).
class yaslha.line.InfoLine(key, value, comment=None)
      Bases: yaslha.line.AbsLine
      Class for lines of INFO blocks.
      An info-block line is given by format(1x, 15, 3x, A), which is not exclusive and matches other
      patterns. This class accept multi-lines, and thus values are List[str] and comments are multi-
      lined string, internally kept as List[str].
class yaslha.line.ValueLine(key: Union[None, int, Sequence[int]], value: Union[str, float],
                              comment: Optional[str] = None)
      Bases: yaslha.line.AbsLine
      Abstract class for value lines in ordinary blocks.
      classmethod new(key: Union[None, int, Sequence[int]], value: Union[str, float], comment:
                       Optional[str] = None) \rightarrow LT2
           Construct line object according to the type of key.
           The resulting object is an instance of a subclass of ValueLine but not DecayLine.
class yaslha.line.NoIndexLine(value, comment=None)
      Bases: yaslha.line.ValueLine
      A line with format(9x, 1P, E16.8, 0P, 3x, '#', 1x, A).
class yaslha.line.OneIndexLine(i, value, comment=None)
      Bases: yaslha.line.ValueLine
      A line with format(1x, 15, 3x, 1P, E16.8, 0P, 3x, '#', 1x, A).
class yaslha.line.TwoIndexLine(i1, i2, value, comment=None)
      Bases: yaslha.line.ValueLine
      A line with format(1x, 12, 1x, 12, 3x, 1P, E16.8, 0P, 3x, '#', 1x, A).
class yaslha.line.ThreeIndexLine(i1, i2, i3, value, comment=None)
      Bases: yaslha.line.ValueLine
      A line with format(1x, 12, 1x, 12, 1x, 12, 3x, 1P, E16.8, 0P, 3x, '#', 1x, A).
class yaslha.line.DecayLine(br, channel, nda=None, comment=None)
      Bases: yaslha.line.ValueLine
      A decay line (3x, 1P, E16.8, 0P, 3x, I2, 3x, N (I9, 1x), 2x, '#', 1x, A).
           Return the branching ratio.
```

```
class yaslha.line.CommentLine(comment: Optional[str] = None)
    Bases: yaslha.line.AbsLine
```

Comment line.

This object is prepared for compatibility and not intended to be inserted in blocks or decay-blocks; therefore dumping methods are not implemented.

A.6. yaslha.parser module

Parsers for SLHA package.

Parsers for SLHA-format, JSON-format, and YAML-format are provided.

```
class yaslha.parser.SLHAParser(**kw)
Bases: object
SLHA-format file parser.

parse(text: str) \rightarrow yaslha.slha.SLHA
Parse SLHA format text and return SLHA object.
```

A.7. yaslha.dumper module

Dumpers to write SLHA data in various format.

```
class yaslha.dumper.BlocksOrder
    Bases: enum.Enum
    Options for block ordering.
    DEFAULT = 0
    KEEP = 1
    ABC = 2
```

class yaslha.dumper.ValuesOrder

Bases: enum.Enum

Options for value ordering.

DEFAULT = 0
KEEP = 1
SORTED = 2

class yaslha.dumper.CommentsPreserve

 $Bases: \ \textbf{enum}. \textbf{Enum}$

Options for comment handling.

NONE = 0

TAIL = 1

ALL = 2

keep_line

Return if to keep line-level comments.

```
keep_tail
class yaslha.dumper.AbsDumper(**kw)
     Bases: object
```

Return if to keep tail comments of value lines.

Abstract class for YASLHA dumpers.

 $config(k: str) \rightarrow Any$

Get a current value of configuration.

 $set_config(k: str, v: Any) \rightarrow None$ Set configuration.

 $dump(slha: yaslha.slha.SLHA) \rightarrow str$ Return dumped string of an SLHA object.

class yaslha.dumper.SLHADumper(**kw) Bases: yaslha.dumper.AbsDumper

A dumper class for SLHA output.

 $config(k: str) \rightarrow Any$

Get a current value of configuration.

 $set_config(k: str, v: Any) \rightarrow None$ Set configuration.

 $dump(slha: yaslha.slha.SLHA) \rightarrow str$

Return SLHA-format text of an SLHA object.

dump_block(block, document_block=False) Return SLHA-format text of a block.

class yaslha.dumper.AbsMarshalDumper(**kw)

Bases: yaslha.dumper.AbsDumper

An abstract class for dumpers handling marshaled data.

 $SCHEME_VERSION = 3$

 $config(k: str) \rightarrow Any$

Get a current value of configuration.

 $set_config(k: str, v: Any) \rightarrow None$ Set configuration.

marshal(slha)

Return Mashaled object of an SLHA object.

marshal_block(block: Union[yaslha.block.Block, yaslha.block.InfoBlock, yaslha.block.Decay]) \rightarrow Mapping[str, Any] Return marshaled object of a block.

class yaslha.dumper.YAMLDumper(**kw)

Bases: yaslha.dumper.AbsMarshalDumper

A dumper for YAML output.

 $dump(slha: yaslha.slha.SLHA) \rightarrow str$

Return YAML-format text of an SLHA object.

```
class yaslha.dumper.JSONDumper(**kw)
    Bases: yaslha.dumper.AbsMarshalDumper
    A dumper for JSON output.
dump(slha: yaslha.slha.SLHA) → str
    Return JSON-format text of an SLHA object.
```

A.8. yaslha.script module

Scripts of this package.

A.9. yaslha.config module

```
Configuration handlers.
```

```
class yaslha.config.SectionWrapper(data: configparser.SectionProxy)
Bases: object

A wrapper class of configparser.SectionProxy.

get_enum(key: str, enum_class: Type[EnumType]) → EnumType
Get an item as an Enum-class object.

get_list(key: str) → List[str]
Get a List[str] object.

class yaslha.config.Config
Bases: configparser.ConfigParser
Dictionary to store the configurations.
```

A.10. yaslha.utility module

```
Utility module.
```

```
yaslha.utility.sort_blocks_default(block_names: Sequence[str]) → List[str]
    Sort block names according to specified order.

yaslha.utility.sort_pids_default(pids: Sequence[T]) → List[Union[T, int]]
    Sort block names according to specified order.
```

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