InSet Documentation

Release 1

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This website provides the documentation for the usage and extension of the INstrumentSETtings beam instrumentation toolbox

This is not in the above paragraph?

CHAPTER

ONE

CONTENTS

1.1 Beam

This module defines the beam class

The module takes the following arguments

Property — Key — Value Type — Remarks

Particle type — par_type — String — Ion type (p, U, Ar etc.)

Charge state — charge_state — Integer — Charge state

Atomic mass — atomic_mass — Integer — 2 for Hydrogen

Particle energy — kin_energy — Float — Kinetic energy per nucleon

Particle number —par_num — Integer — Total number of particles (ions)

Distribution type — d_type — String — a for arbitrary, p for parabolic, g for gaussian and kv for KV distribution

X Distribution —- x_dist — List of integers for 'a', two Ints for parabolic and gaussian — Phase space distribution in x plane

Y Distribution —- y_dist — Same as X Dist. — Phase space distribution in y plane

Z Distribution —- z_dist — Same as X Dist. — Phase space distribution in z/s plane

> par_type=None, charge_state= None, atomic_mass = None, par_num= None, d_type = 'ggg', x_dist = [0,5], y_dist =[0,5], z_dist =[0,100]

The arguments can be passed in this order or by defining a dictionary or by calling a file where the parameters exist

class beam.**dynamicbeam**(**args*, ***kwargs*)

> This attributes are similar to a static beam, however, the beam energy, number of beam particles and beam structure is updated for several turns (depends on the length of list) and stored
>
> **listfiles**()
>
> > THis function will list all the static and dynamic beams
>
> **plot**()
>
> > This function will plot the profile of the beam in the mentioned axis
>
> **save**(*name_of_file*, *description*)
>
> > This function will save the beam object to an external file in the directory called "defined_beams" in the source directory
>
> **structure**()
>
> > This function defines the structure of the beam based on the beam parameters

class beam.**staticbeam**(**args*, ***kwargs*)
Beam class defines the static beam object

It creates a beam object instance the parameters in a special order are specified, or simply by passing a beam dictionary

A save keyword 's' can be used to save the beam object in a file, which can be loaded later

listfiles(*staticbeam*)
THis function will list all the static and dynamic beams

load(*name_of_file*)
This function will load the beam object from the specified file in the directory called "defined_beams" in the source directory

plot()
This function will plot the profile of the beam in the mentioned axis

save(*name_of_file*, *description*)
This function will save the beam object to an external file in the directory called "defined_beams" in the source directory

structure()
This function defines the structure of the beam based on the beam parameters

1.2 Indices and tables

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1.3 Machine

This module defines the beam object

The module takes the following arguments

Property — Key — Value type — Description

Circumference — circumference — Float — Circumference of the machine

Compaction factor — com_fact — Float — Momentum compaction factor

Set tune — set_tune — List of Float — Horizontal and vertical tune

Set Chromaticity — set_chro — List of float — Horizontal and vertical chromaticity

class machine.**dynamicmachine**(**args*, ***kwargs*)
This attributes are similar to a static beam, however, the beam energy, number of beam particles and beam structure is updated for several turns (depends on the length of list) and stored

save(*name_of_file*, *description*)
This function will save the beam object to an external file in the directory called "defined_beams" in the source directory

class machine.**staticmachine**(**args*, ***kwargs*)
The machine class defines all the machine parameters

save(*name_of_file*, *description*)
This function will save the beam object to an external file in the directory called "defined_beams" in the source directory

1.3.1 Indices and tables

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Use the tutorial here to learn about Sphinx: *[SPHINXDOC]*.

1.4 Device Modules

Each Diagnostic sensor description and settings are documented here.

1.4.1 Current Transformers

Generic Transformer object Generic Trafo module takes beam and machine object and returns the TrafoOut

The module takes the following arguments

Beam — Beam object fully specifying the beam

Machine — Accelerator setting object

TrafoType (Optional) — Specific transformer types to define exact Trafo behaviour

class TrafoModule.**generictrafo**(**args*, ***kwargs*)
The Generic trafo class defines all the generic trafo parameters

combine_systems(**args*, ***kwargs*)
Combines all the subsystems to the sensor

load(*name_of_file*)
Loads the specific trafo settings

optimize()
Predicts optimal settings for all the variable parameters in the device module, common module or any combination

output(*observable_in*)
Calculates the output of the device module or the system

save(*name_of_file*, *description*)
This function will save the beam object to an external file in the directory called "defined_beams" in the source directory

1.4.2 Add functions from Python library

```
io.open()
```

1.4.3 Indices and tables

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1.5 Common Modules

The common modules consist of electronics, optics systems cables etc. They are described and documented here.

1.5.1 Amplifiers and Attenuators

Generic amplifier and attenuator definition Generic Amplifier Module

The module takes the following arguments

Amplification — The amplification/attenuation in (dB)

Noise figure — Accelerator setting object

Input Noise — When the input is open or terminated (in nV/sqrt(Hz))

AmplifierType (Optional) — Specific amplifier implementation

class AmpAttModule.**genericAmpAtt**(**args*, ***kwargs*)
The Generic trafo class defines all the generic trafo parameters

save(*name_of_file*, *description*)
This function will save the beam object to an external file in the directory called "defined_beams" in the source directory

1.5.2 Lenses

1.5.3 Indices and tables

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Use the tutorial here to learn about Sphinx: *[SPHINXDOC]*.

[SPHINXDOC] This is Sphinx doc documentation –> http://sphinx-doc.org/latest/tutorial.html.

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