Geant val V2

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Supervisors : Dmitri Konstantinov & Gabriele Cosmo

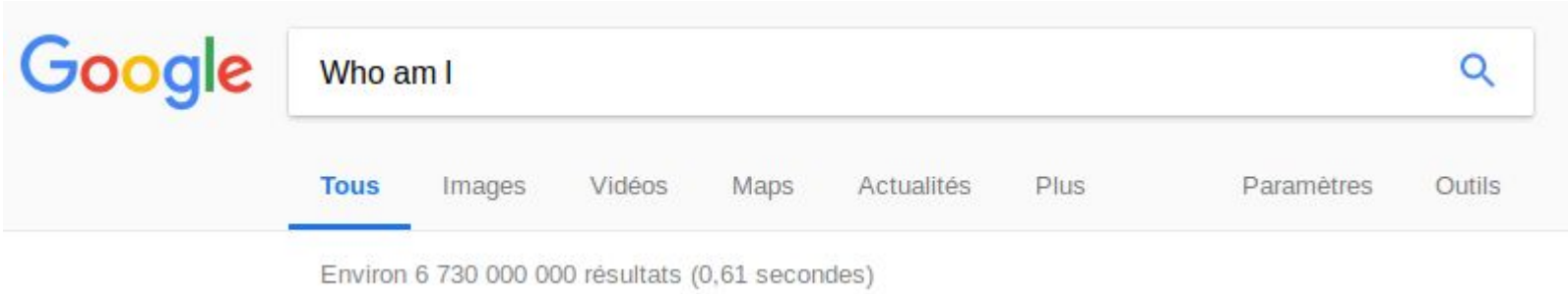
Who am I ?

Who am I ?

```
[lfreyerm@lxplus068 ~]$ whoami
lfreyerm
```

Who am I ?

```
[lfreyerm@lxplus068 ~]$ whoami
lfreyerm
```



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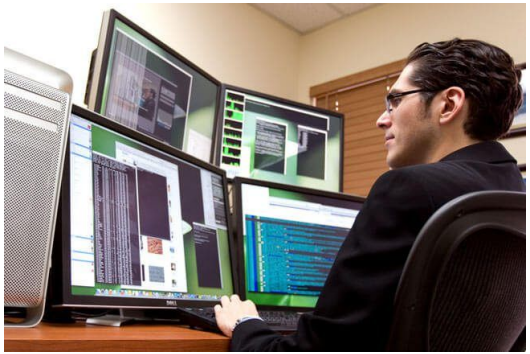


The Geant val project

- Was originally created for the simplified calorimeter test.
- Need to organize Geant4 test results regression testing.
- Development of a tool that can provide :
  - Visual comparison
  - Statistical tests

Geant val V1

- **Features**
  - Automated statistical comparison of one test between two versions of Geant4.
  - Menu to pick some test parameters and display the corresponding data.
  - User defined layouts to display organised plots on one page.
  - It works ! (Important !)

- **Technology**
  - Client: AngularJS
  - Server: NodeJS + Express
  - Database: PostgreSQL

test37

filter menu entries
validation mode -- χ^2 test
ROOT plots JSROOT plots

Version
10.5.beta01_lcuts

Beam
e-

Beam energy
0.015

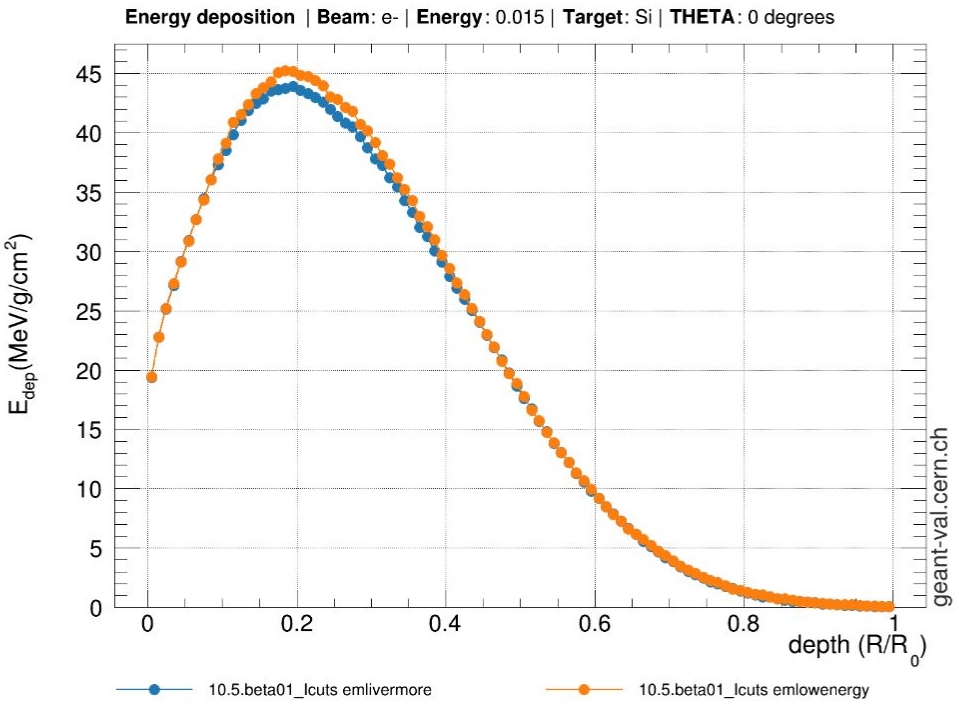
Physics List/Model
emlivermore emlowenergy

Target
Si

Secondary
None

Observable
Default group (Deselect all)
energy deposition

Axis settings



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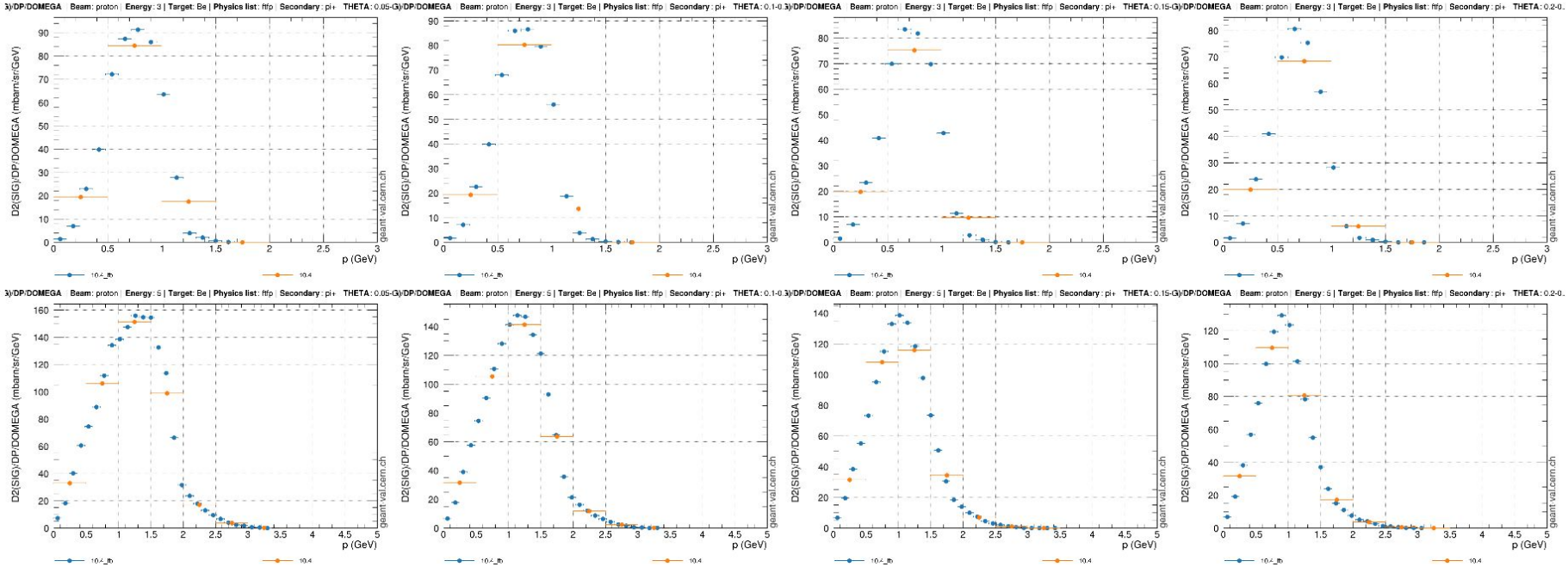
User layouts



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Why developing a new version ? (It takes time !!)

- AngularJS is not developed anymore. The long time support will end in 2021.
- AngularJS has big performance issues. (Displaying a lot of plots is a heavy task)
- The backend was originally developed for the simplified calorimeter test :
  - The parameter list is hardcoded in the database schema.
  - Workarounds are sometimes needed to implement other tests.
  - Developing new features in the client is hard because the data structure wasn’t built to handle different tests.

Design choices for Geant val V2

- **Data structure :** No assumption on the parameters the tests are using
  - No hard coded parameters.
  - Easy way to add new parameters for new tests.

- **New client features**
  - User account interface to manage tests and data.
  - Template generator to avoid writing xml templates manually (with real time preview)

- **Technology**
  - Angular 2+ (Today: Angular 6)
  - Node + Loopback (Saves a lot of time on basic API implementation)

Technology - Loopback

- Node framework for REST API creation
- Avoids having to create basic expected REST API features
  - Prebuilt user management
  - Auto-generated REST endpoints

Technology - Angular

- Front-end javascript framework (concurrents : React, Vue)
- Allows to create reusable components (page parts)
  - Easier unit testing
  - Encapsulated styling and behavior
- Uses typescript
  - Alternative to javascript that uses types.
  - Better static checking
  - Forces the developer to write better code.
  - Is transpiled to javascript to be used in the browser.
- **It’s not AngularJS /!**

Template generator

- Allows users to create their own layouts to compare data.
- As easy to use as possible, but still flexible.
- Works better with structured data.

1 - Choose your test

The test

2 - Select your parameters

Observable	Select...	Constant
Tool version	Select...	Constant
Beam particle	Select...	Constant
Secondary particle	Select...	Constant

1 - Choose your test

The test

2 - Select your parameters

Observable	The first observable	Constant
Tool version	v 42, v 1664	Variable
Beam particle	B+, anti_delta(1620)+, anti_delta(1620)++	Variable
Secondary particle	pi+	Constant

pi-

1 - Choose your test

The test

2 - Select your parameters

Observable	The first observable ✖	Constant
Tool version	v 42 ✖ v 1664 ✖	Variable
Beam particle	B+ ✖ anti_delta(1620)+ ✖ anti_delta(1620)++ ✖	Variable
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pi-

Template generator

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The test

2 - Select your parameters

Observable	The first observable	Constant
Tool version	v 42, v 1664	Variable
Beam particle	B+, anti_delta(1620)+, anti_delta(1620)++	Variable
Secondary particle	pi+, pi-	Variable

3 - Preview

Secondary particle: pi+

Beam particle: B+	Beam particle: anti_delta(162...	Beam particle: anti_delta(162...
Tool version: v 42 **and** v 1664	Tool version: v 42 **and** v 1664	Tool version: v 42 **and** v 1664

Secondary particle: pi-

Beam particle: B+	Beam particle: anti_delta(162...	Beam particle: anti_delta(162...
Tool version: v 42 **and** v 1664	Tool version: v 42 **and** v 1664	Tool version: v 42 **and** v 1664

Generate template

Template generator

1 - Choose your test

The test

2 - Select your parameters

Observable	The first observable	Constant
Tool version	v 42, v 1664	Variable
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Secondary particle: pi+

Beam particle: B+	Beam particle: anti_delta(162...	Beam particle: anti_delta(162...
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Beam particle: B+	Beam particle: anti_delta(162...	Beam particle: anti_delta(162...
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Generate template

Template generator

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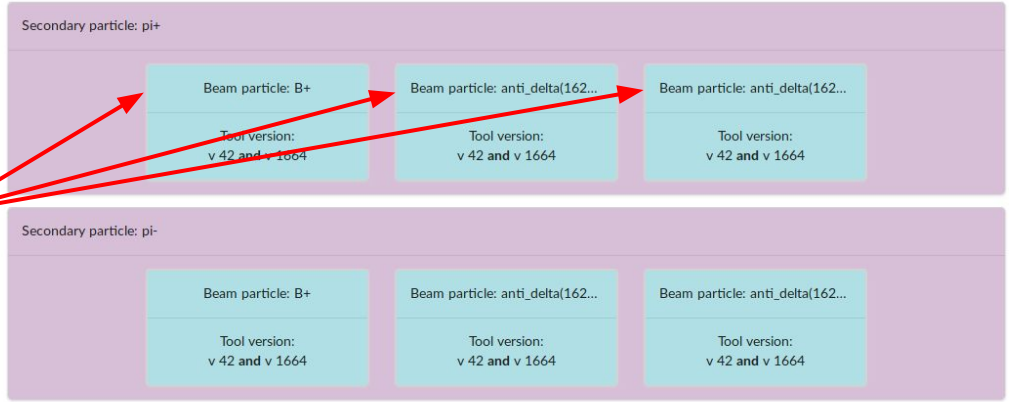
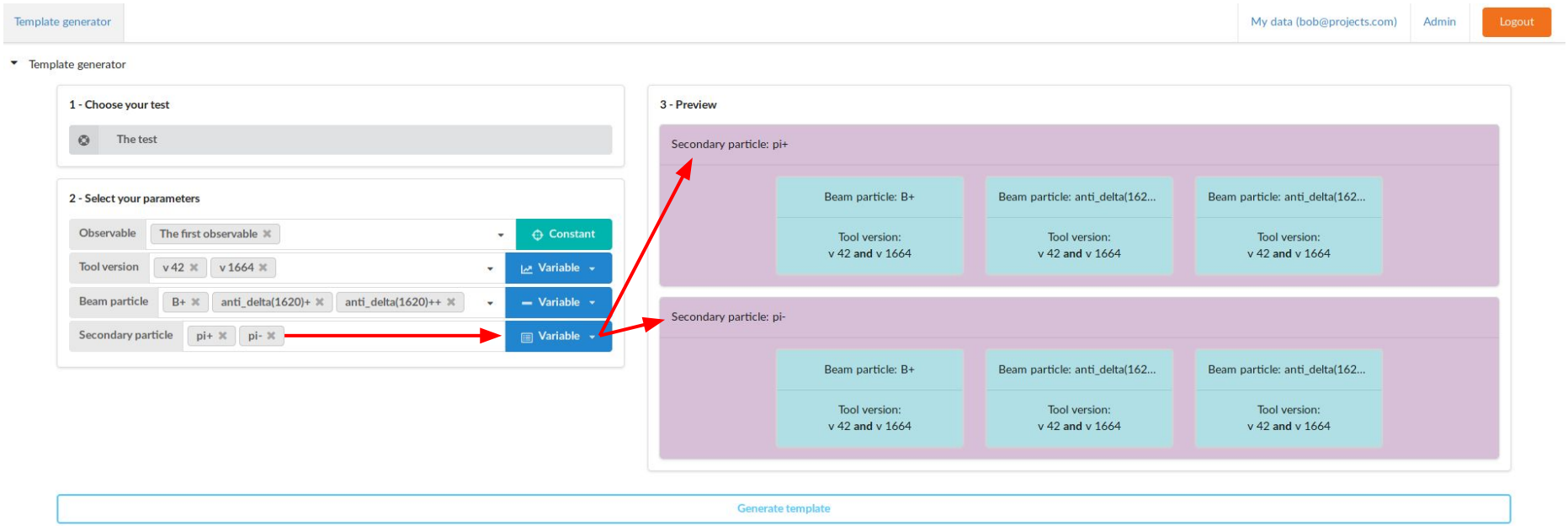
3 - Preview



Generate template


Template generator
My data (bob@projects.com)
Admin
Logout
Template generator
1 - Choose your test
The test
2 - Select your parameters
Observable
The first observable
Constant
Tool version
v 42
v 1664
Variable
Beam particle
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Variable
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Secondary particle: pi-
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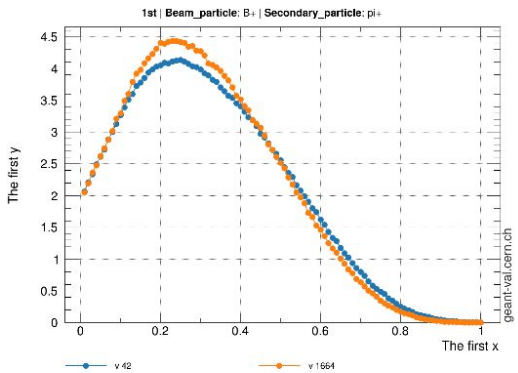
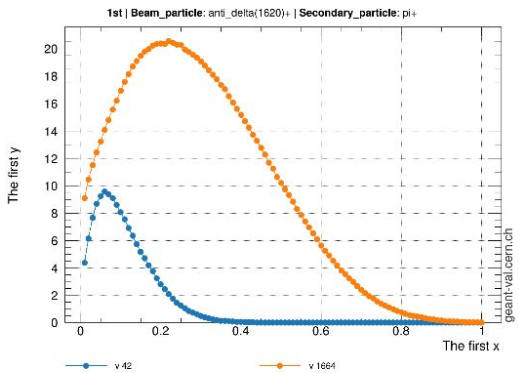
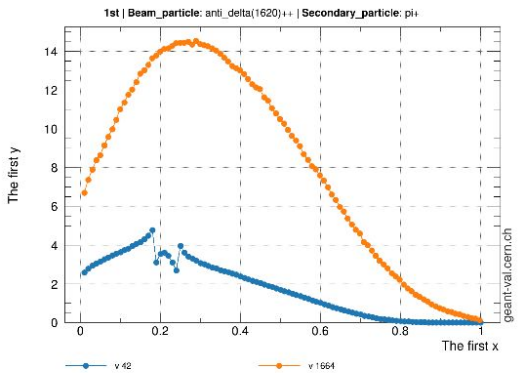
Tool version:
v 42 and v 1664
Beam particle: anti_delta(162...
Tool version:
v 42 and v 1664
Beam particle: anti_delta(162...
Tool version:
v 42 and v 1664
Generate template

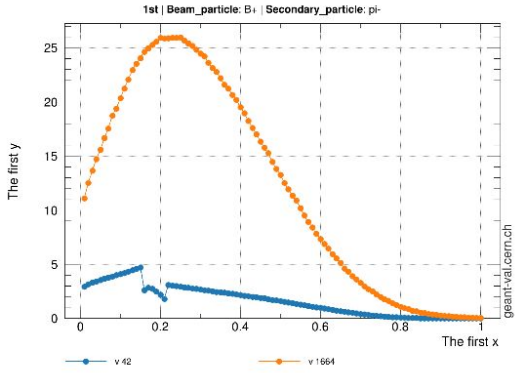
Template generator

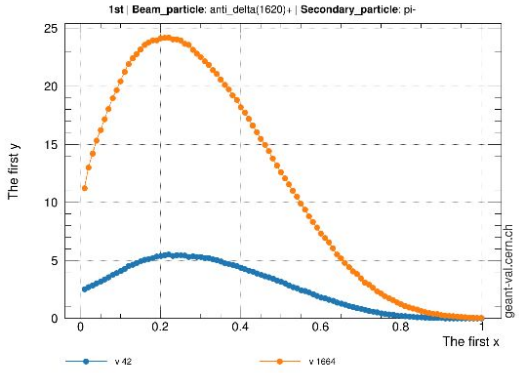
- Display all plots
  - Secondary particle = pi+
  - Secondary particle = pi-

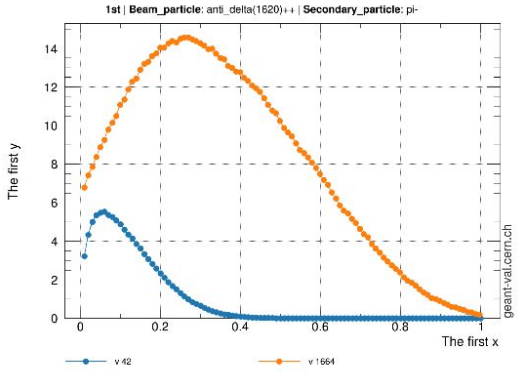












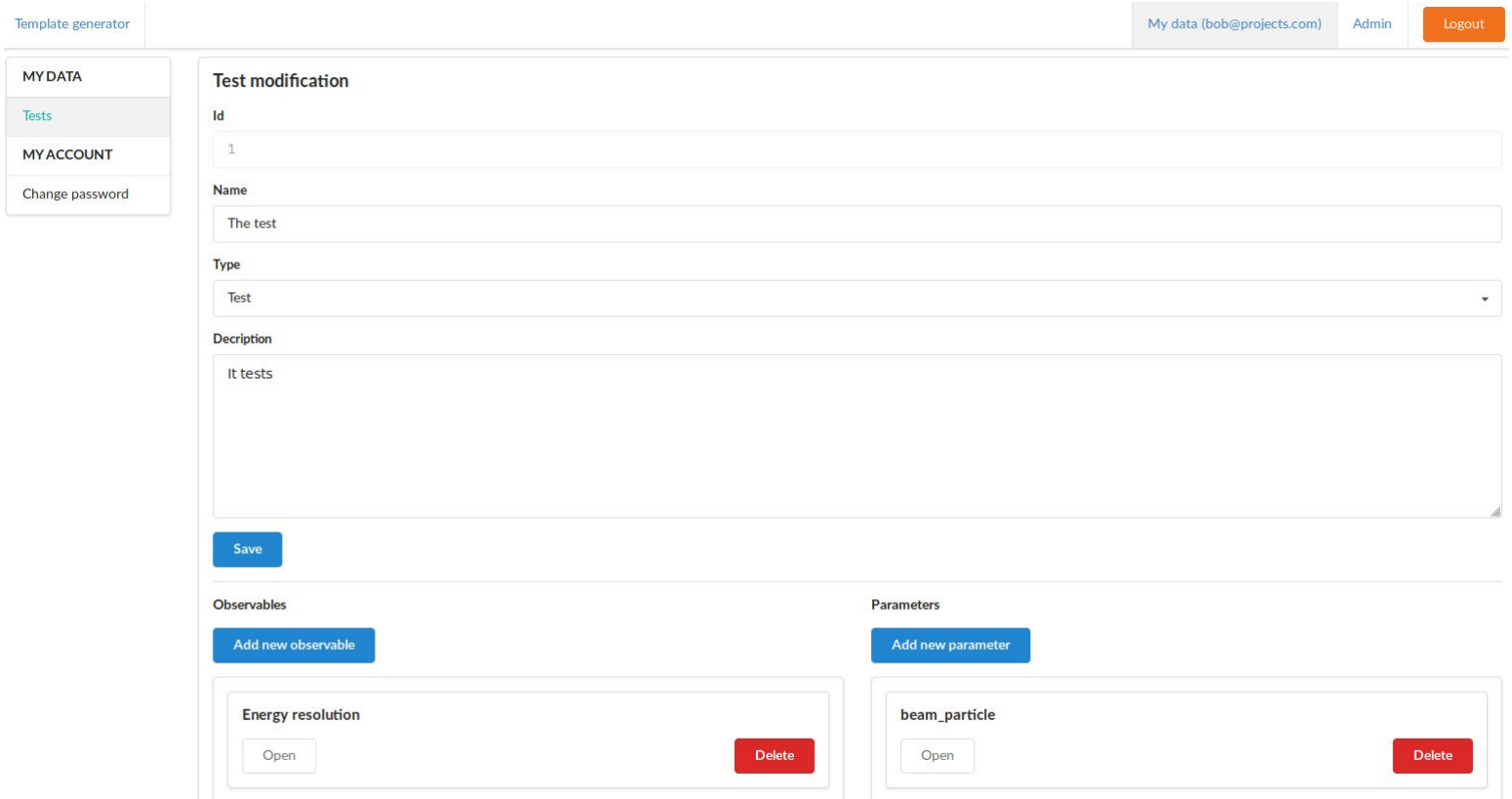
Template generator - next features

- Possibility to select experimental data to compare your test with (and maybe with similar tests).
- ‘Save’, ‘Export’ and ‘Load’ buttons to save your templates to build them only once.

Other front-end features not implemented yet :

- Statistical comparison of plots. Could use a menu similar to the template generator.
- A “Free template” generator to build more complex templates.
  - The user doesn’t need to create regular rows, columns.
  - The template creation will take more time (needs a working ‘save’ feature)

Example of other pages



Thank you for your time and your attention !