

# Building a complex Angular 2 application

A Journey

*Javier Martín Montull*

*14th February 2017, It's about U and I Conference, CERN*

The challenge

```

<record>
  <controlfield tag="001">1497201</controlfield>
  <controlfield tag="005">20170120134018.0</controlfield>
  <datafield tag="024" ind1="8" ind2=" " >
    <subfield code="a">oai:cds.cern.ch:2232052</subfield>
    <subfield code="p">cerncds:FULLTEXT</subfield>
    <subfield code="p">cerncds:cms-pas</subfield>
  </datafield>
  <datafield tag="035" ind1=" " ind2=" " >
    <subfield code="9">http://cds.cern.ch/oai2d</subfield>
    <subfield code="h">2016-11-13T11:02:29Z</subfield>
    <subfield code="n">marcxml</subfield>
    <subfield code="a">oai:cds.cern.ch:2232052</subfield>
    <subfield code="d">2016-11-12T22:28:14Z</subfield>
  </datafield>
  <datafield tag="035" ind1=" " ind2=" " >
    <subfield code="9">CDS</subfield>
    <subfield code="a">2232052</subfield>
  </datafield>
  <datafield tag="035" ind1=" " ind2=" " >
    <subfield code="a">CMS:2016tgd</subfield>
    <subfield code="9">INSPIRETeX</subfield>
  </datafield>
  <datafield tag="035" ind1=" " ind2=" " >
    <subfield code="9">DESY</subfield>
    <subfield code="z">D16-kj46x</subfield>
  </datafield>
  <datafield tag="037" ind1=" " ind2=" " >
    <subfield code="a">CMS-PAS-HIG-16-035</subfield>
  </datafield>
  <datafield tag="110" ind1=" " ind2=" " >
    <subfield code="a">CMS Collaboration</subfield>
  </datafield>
  <datafield tag="245" ind1=" " ind2=" " >
    <subfield code="a">
      A Search for Beyond Standard Model Light Bosons Decaying into M
    </subfield>
  </datafield>
  <datafield tag="269" ind1=" " ind2=" " >
    <subfield code="c">2016</subfield>
  </datafield>
  <datafield tag="500" ind1=" " ind2=" " >
    <subfield code="a">Preliminary results</subfield>
  </datafield>

```

```

"accelerator_experiments": [
  {
    "accelerator": "CERN LHC",
    "curated_relation": true,
    "experiment": "CERN-LHC-CMS",
    "facet_experiment": [
      [
        "CERN-LHC-CMS"
      ]
    ],
    "recid": 1108642,
    "record": {
      "$ref": "http://localhost:5000/api/experiments/1108642"
    }
  }
],
"collaboration": [
  {
    "value": "CMS"
  }
],
"collections": [
  {
    "primary": "NOTE"
  },
  {
    "primary": "CORE"
  },
  {
    "primary": "HEP"
  }
],
"control_number": 1497201,
"corporate_author": [
  "CMS Collaboration"
],
"creation_modification_date": [
  {
    "creation_date": "2016-11-18",
    "modification_date": "2016-11-13"
  }
]

```

MARC-XML



JSON



Devs



Librarians

record revision: 2017.01.20 13:40:18



Record

1497201 Rec I

Search

Submit Cancel

Switch to: Read-only

Tickets

See in RT #1 13 Nov 2016 04:01 Inspire-References

[new ticket]

Fields

Add Delete selected

View

Holding Pen

Undo/Redo

< >

History

Ready Special symbols Help

Display

- References
- Authors
- Others

Curator view

001		1497201	
005		20170120134018.0	
<input type="checkbox"/> 0248_	<input type="checkbox"/> 2	DOI	
	<input type="checkbox"/> a	oai.cds.cern.ch:2232052	
	<input type="checkbox"/> p	cerncds:FULLTEXT	
	<input type="checkbox"/> p	cerncds:cms-pas	+
<input type="checkbox"/> 035_	<input type="checkbox"/> 9	http://cds.cern.ch/oai2d	
	<input type="checkbox"/> a	oai.cds.cern.ch:2232052	
	<input type="checkbox"/> d	2016-11-12T22:28:14Z	
	<input type="checkbox"/> h	2016-11-13T11:02:29Z	
	<input type="checkbox"/> m	marcxml	+
<input type="checkbox"/> 035_	<input type="checkbox"/> 9	CDS	
	<input type="checkbox"/> a	2232052	+
<input type="checkbox"/> 035_	<input type="checkbox"/> 9	INSPIRETeX	
	<input type="checkbox"/> a	CMS:2016tgd	+
<input type="checkbox"/> 035_	<input type="checkbox"/> 9	DESY	
	<input type="checkbox"/> z	D16-kj46x	+
<input type="checkbox"/> 037_	<input type="checkbox"/> a	CMS-PAS-HIG-16-035	+
<input type="checkbox"/> 041_	<input type="checkbox"/> a	language (if not English)	+
<input type="checkbox"/> 084_	<input type="checkbox"/> 2	PACS	
	<input type="checkbox"/> a	pacs	+
<input type="checkbox"/> 100_	<input type="checkbox"/> a	Familyname, Firstname	
	<input type="checkbox"/> j	ORCID:	
	<input type="checkbox"/> m	email	
	<input type="checkbox"/> u	Affiliation	+
<input type="checkbox"/> 110_	<input type="checkbox"/> a	CMS Collaboration	+
<input type="checkbox"/> 210_	<input type="checkbox"/> a	title_variation - extra words/phrasings for title	+
<input type="checkbox"/> 242_	<input type="checkbox"/> a	Translated title (English)	+
<input type="checkbox"/> 245_	<input type="checkbox"/> a	A Search for Beyond Standard Model Light Bosons Decaying into Muon Pairs	+
<input type="checkbox"/> 260_	<input type="checkbox"/> c	publication date YYYY-MM-DD	+
<input type="checkbox"/> 269_	<input type="checkbox"/> c	2016	+
<input type="checkbox"/> 300_	<input type="checkbox"/> a	999	+
<input type="checkbox"/> 500_	<input type="checkbox"/> a	Preliminary results	+
<input type="checkbox"/> 520_	<input type="checkbox"/> a	A dataset corresponding to $2.8 \cdot 10^{13}$ of proton-proton collisions at $\sqrt{s} = 13 \text{ TeV}$ was recorded by the CMS experiment at the CERN LHC. These data are used to search for new light bosons with a mass in the range $0.25-8.5 \text{ GeV}/c^2$ decaying into muon pairs. No excess is observed in the data, and a model-independent upper limit on the product of the	

How are we going to edit the content now?

*–Anonymous INSPIREHEP cataloger*

JSON is a standard, we can use some ready made solution

*-Anonymous INSPIREHEP developer*

## Person



JSON

Properties

### name

First and Last name

### age

### favorite color



### gender

## Location



JSON

Properties

### city

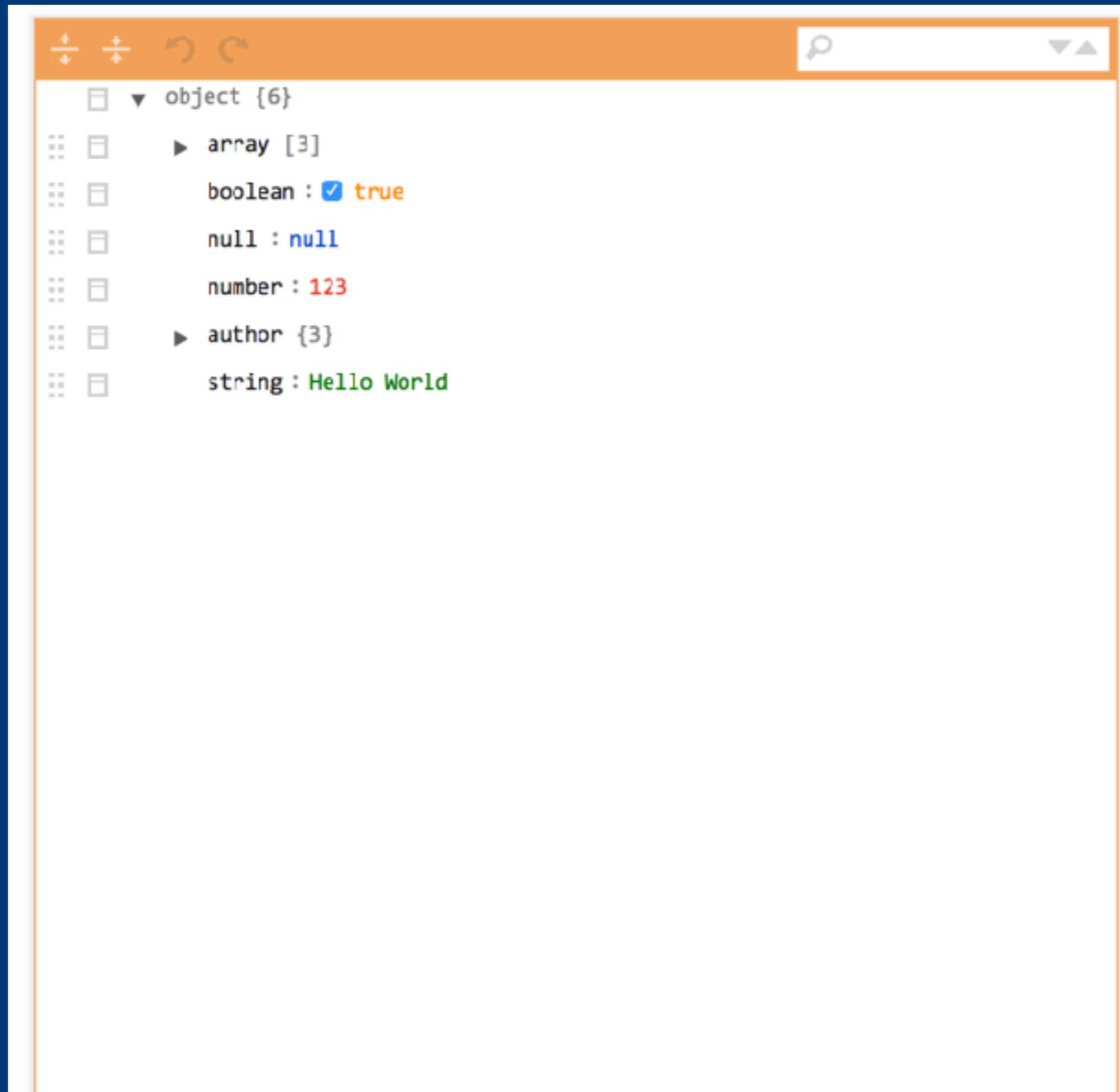
### state

### citystate

This is generated automatically from the previous two fields

## Pets





<https://github.com/josdejong/jsoneditor>



Time to build our own



(with Angular 2)

Wait, what is TypeScript?



# Angular 2 is built with TypeScript

Features of ES6 (classes, inheritance, modules,...) + typings

Nice integration in IDEs like VisualStudio Code

Get errors early on, good autocompletion

Easy to work with

# First observations

Less concepts and easier than Angular 1

Module

Component

Metadata

Template

Data Binding

Service

Directive

Dependency Injection

# Code can be easily organized

HTML template

Styling

Tests

Logic

```
▶ abstract-field
▶ abstract-list-field
▶ abstract-tracker
▶ add-field-dropdown
▶ add-new-element-button
▶ any-type-field
▶ autocomplete-input
▶ complex-list-field
▶ editor-previewer
▶ find-replace
▶ html-view
▶ modal-view
▶ object-field
▶ primitive-field
▶ primitive-list-field
▶ ref-field
◀ searchable-dropdown
  index.ts
  searchable-dropdown.component.html
  searchable-dropdown.component.scss
  searchable-dropdown.component.spec.ts
  searchable-dropdown.component.ts
▶ shared
▶ table-list-field
▶ title-dropdown
▶ tree-menu
▶ value-change-watcher
  index.ts
  json-editor.component.html
  json-editor.component.scss
  json-editor.component.ts
  json-editor.module.ts
  tsconfig.json
```

How to get started with your application

# Starter packs

Started with:

<https://github.com/AngularClass/angular2-webpack-starter>

Went with:

<https://github.com/angular/angular-cli>

Nice defaults out of the box

Opinionated for good or bad

So we started building our app

# First prototype

titles	source	title		
	arXiv	Wrapping corrections for non-diagonal boundaries in AdS/CFT		
thesaurus_terms	classification_scheme	keyword		
	INSPIRE	string: open		
	INSPIRE	membrane model		
	INSPIRE	S-matrix		
license	imposing	arXiv		
	url	<a href="http://arxiv.org/licenses/nonexclusive-distrib/1.0/">http://arxiv.org/licenses/nonexclusive-distrib/1.0/</a>		
authors	affiliations.0.value	inspire_bal	full_name	
	Wigner RCP, Budapest	<a href="#">Z.Bajnok.1</a>	Bajnok, Zoltan	
	Miami U.	<a href="#">R.I.Nepomechie.1</a>	Nepomechie, Rafael I.	
urls	url	description	size	
	<a href="http://inspirehep.net/record/1408310/files/plot2.png">http://inspirehep.net/record/1408310/files/plot2.png</a>	00000	3379	
	<a href="http://inspirehep.net/record/1408310/files/arXiv:1512.01296.pdf">http://inspirehep.net/record/1408310/files/arXiv:1512.01296.pdf</a>		530335	
	<a href="http://inspirehep.net/record/1408310/files/scoap3-fulltext.pdf?subformat=pdfa">http://inspirehep.net/record/1408310/files/scoap3-fulltext.pdf?subformat=pdfa</a>	Article from SCOAP3	489959	

<https://github.com/inspirehep/record-editor/issues/2>

# Our first road block



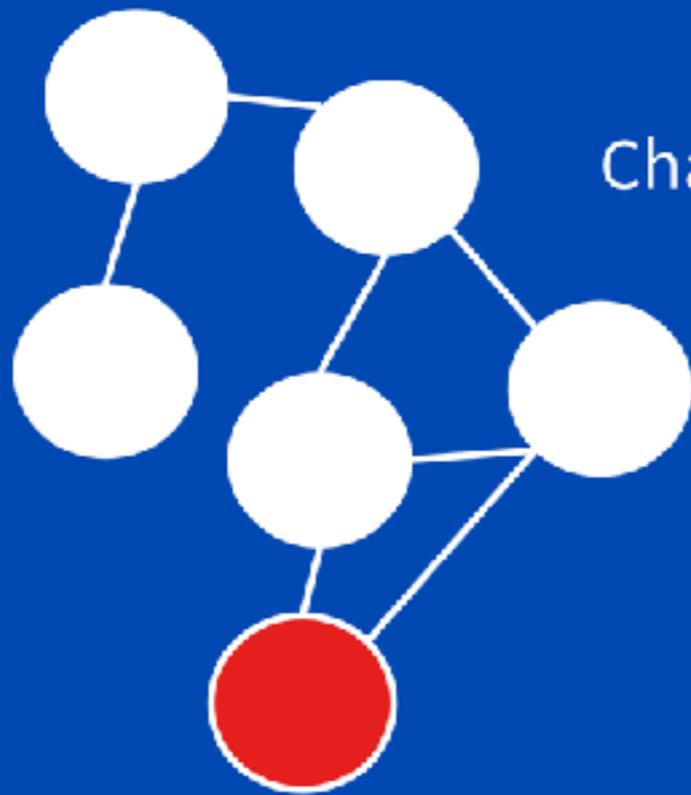
# Record Editor

titles	source	title	+ ▾	
	arXiv	Top-quark production measurements	×	
+				
abstracts	value	source		
	Recent measurements of top-quark production	arXiv	×	
+				
publication info	cnum		+ ▾	
	C15-08-17	×	×	
+				
accelerator experiments	curated_relation	experiment	record.\$ref	+ ▾
	<input checked="" type="checkbox"/>	CERN-LHC-ATLAS	http://localhost:5000/api/experiment	×
	<input checked="" type="checkbox"/>	CERN-LHC-CMS	http://localhost:5000/api/experiment	×
	<input type="checkbox"/>	FNAL-E-0830		×
	<input checked="" type="checkbox"/>	CERN-LHC-LHCB	http://localhost:5000/api/experiment	×

# How change detection works in Angular 2

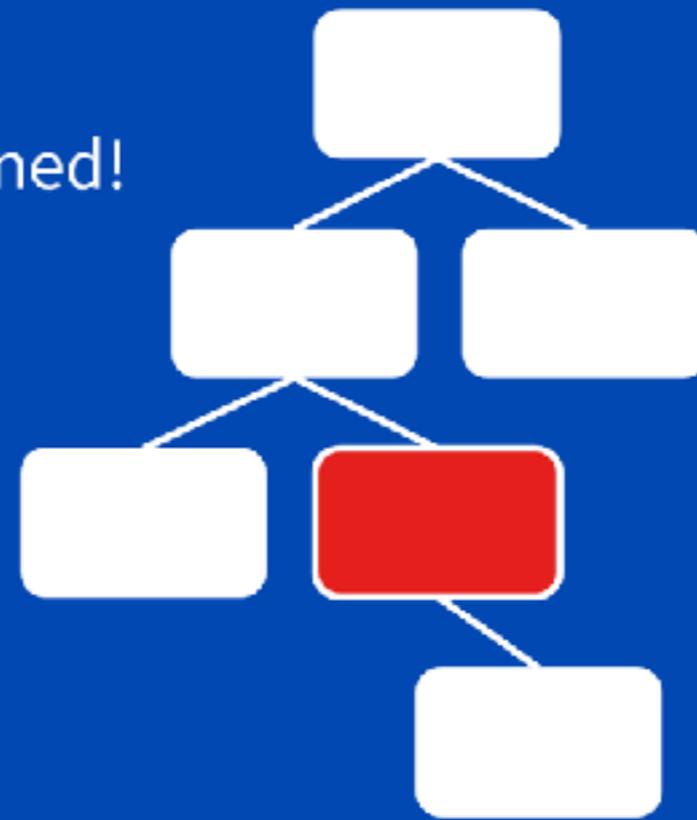
Source: <https://blog.thoughttram.io/angular/2016/02/22/angular-2-change-detection-explained.html>

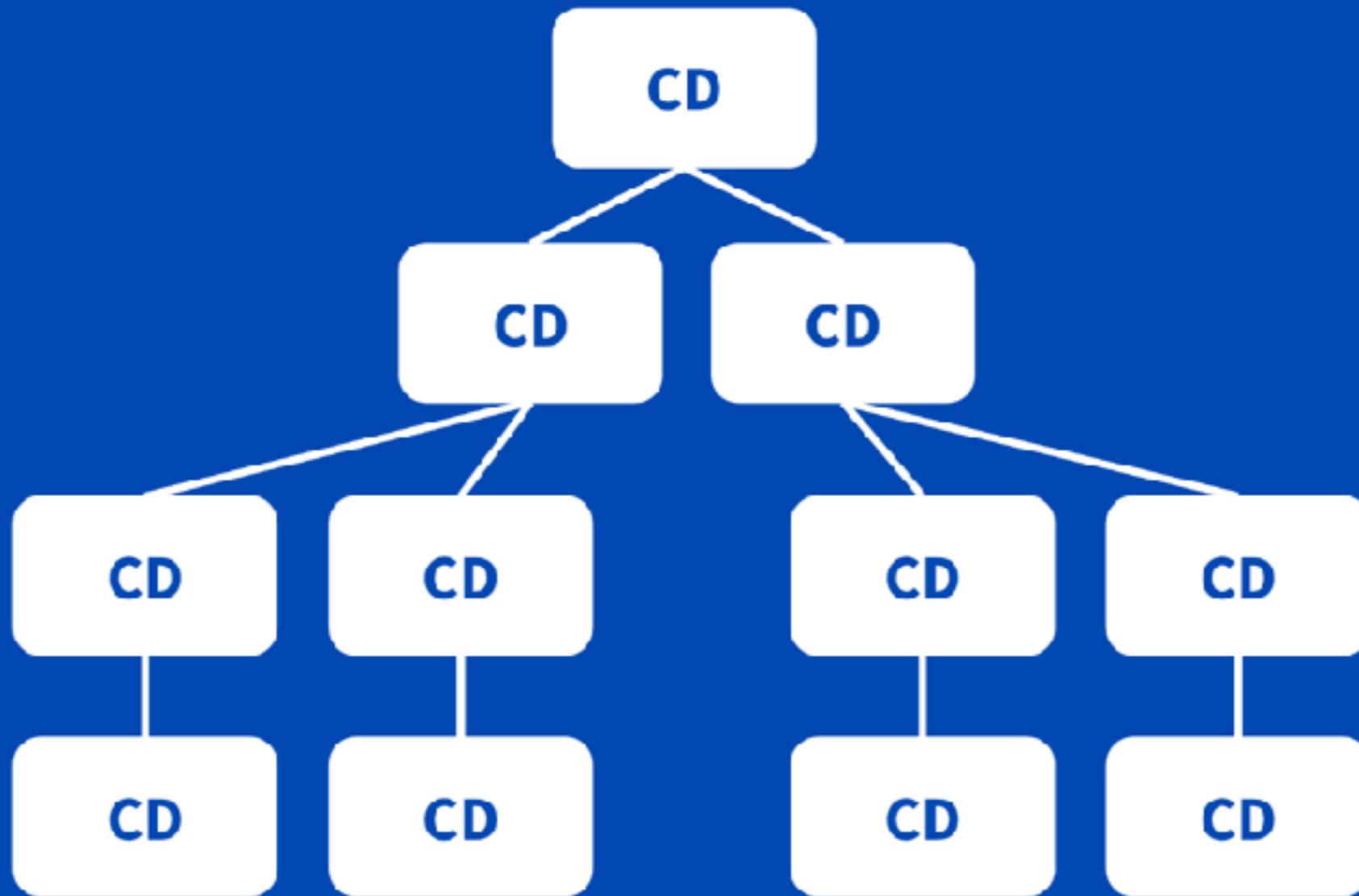
## MODEL

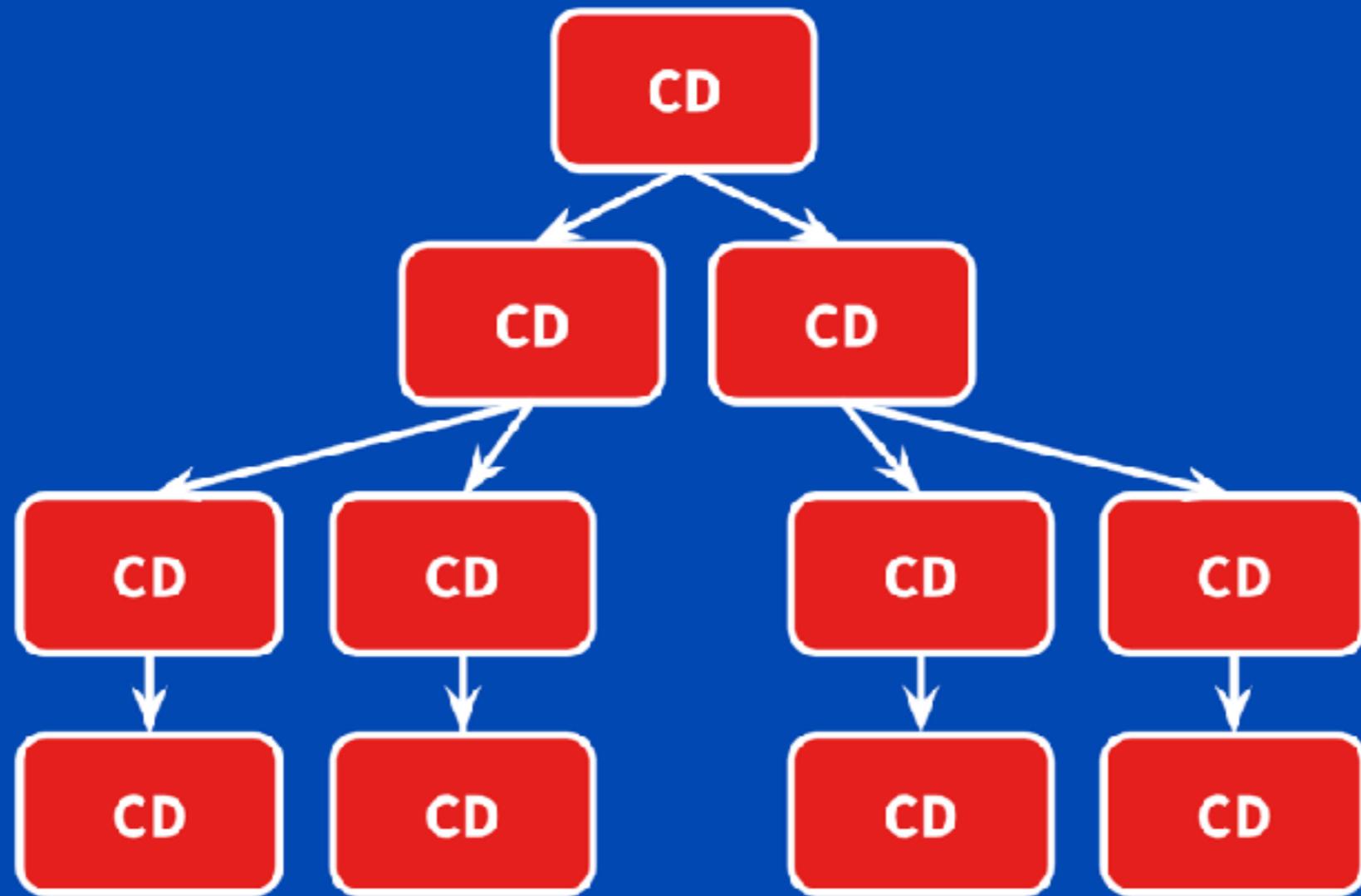


Change happened!

## DOM





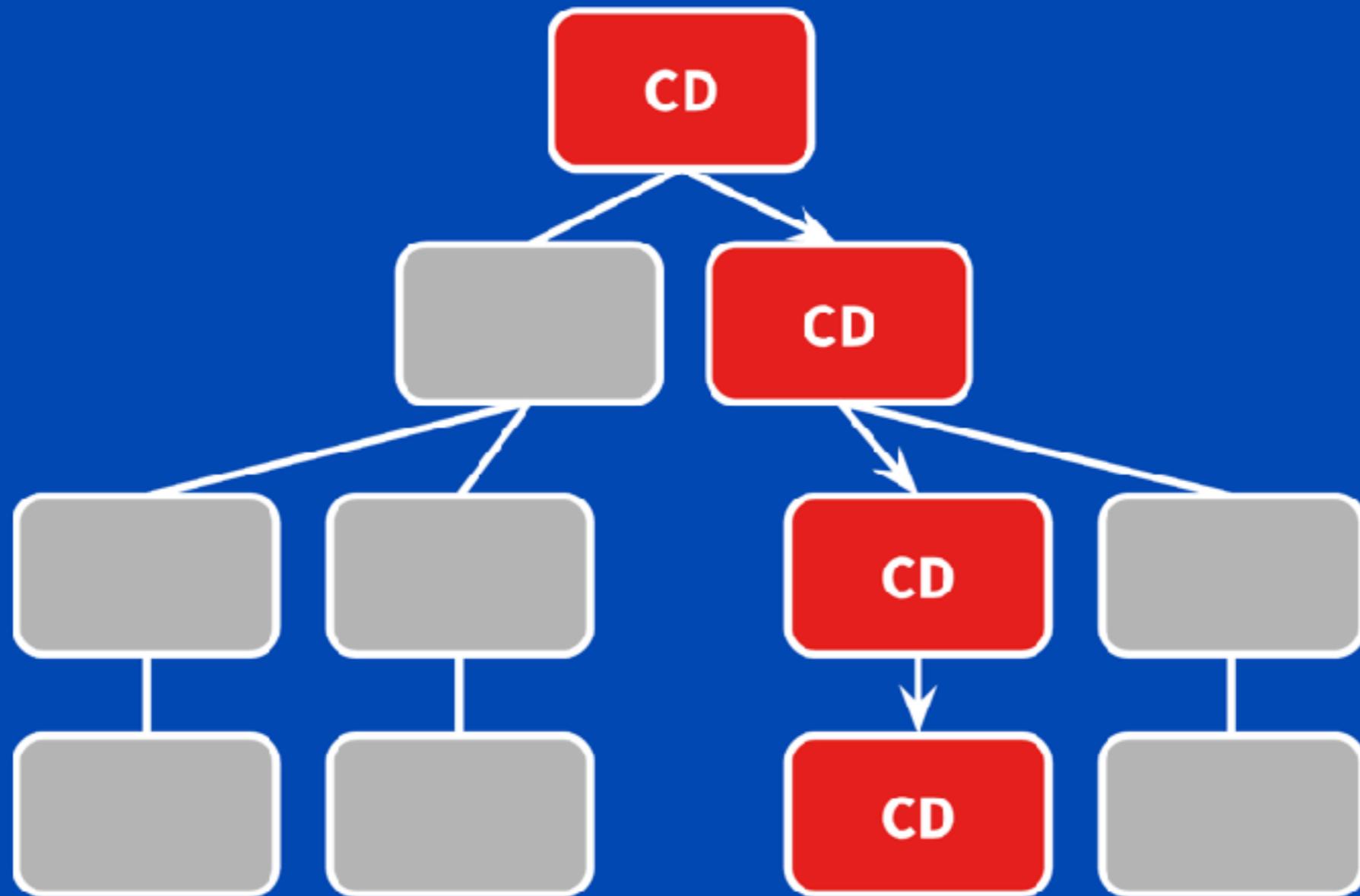


The JSON files on INSPIRE can have up to 2000 authors and 100s of references - 1MB

Change detection made the interface **VERY slow**

Smarter change detection with Immutable JS

**IMMUTABLE**



Before

## Record Editor

titles	source	title	+ -	
	arXiv	Top-quark production measurements	x	
+				
abstracts	value	source		
	Recent measurements of top-quark production	arXiv	x	
+				
publication info	cnum		+ -	
	C15-08-17		x	
+				
accelerator experiments	curated_relation	experiment	record.\$ref	+ -
	<input checked="" type="checkbox"/>	CERN-LHC-ATLAS	http://localhost:5000/api/experiment	x ▾
	<input checked="" type="checkbox"/>	CERN-LHC-CMS	http://localhost:5000/api/experiment	x ▲ ▾
	<input type="checkbox"/>	FNAL-E-0830		x ▲ ▾
	<input checked="" type="checkbox"/>	CERN-LHC-LHCB	http://localhost:5000/api/experiment	x ▲ ▾

After

## Record Editor

titles	source	title	+ -	
	arXiv	Top-quark production measurements	x	
+				
abstracts	value	source		
	Recent measurements of top-quark production	arXiv	x	
+				
publication info	cnum		+ -	
	C15-08-17		x	
+				
accelerator experiments	curated_relation	experiment	record.\$ref	+ -
	<input checked="" type="checkbox"/>	CERN-LHC-ATLAS	http://localhost:5000/api/experiment	x ▾
	<input checked="" type="checkbox"/>	CERN-LHC-CMS	http://localhost:5000/api/experiment	x ▲ ▾
	<input type="checkbox"/>	FNAL-E-0830		x ▲ ▾
	<input checked="" type="checkbox"/>	CERN-LHC-LHCB	http://localhost:5000/api/experiment	x ▲ ▾

What about styling?

<https://github.com/valor-software/ng2-bootstrap>

Bootstrap 3 & 4 components

Semantic versioning not respected

<https://github.com/angular/material>

Material Design components

Official from angular organization

Very popular

# Code quality and deployment



+



Travis CI

# Code quality (tslint)

Custom lint rules

Inline disabling / enabling of rules

Automatic fixing of formatting & style violations

Integration with IDEs and build systems (Gulp JS)

<https://github.com/palantir/tslint>

Testing

# Unit test with Karma + Jasmine

```
(invent03)
jndaniel@jndanielmac-2: ~/workspace/ng2-json-editor$ npm run test:unit
> ng2-json-editor@0.2.0 test:unit /Users/jndaniel/virtualenvs/invent03/src/editing/ng2-json-editor
> ng test --watch=false

As a forewarning, we are moving the CLI npm package to "angular/cli" with the next release,
which will only support Node 6.9 and greater. This package will be officially deprecated
shortly after.

To disable this warning use "ng set --global.warnings.packageDeprecation=false".

92% chunk asset optimizer
```

# Code coverage with Karma + Istanbul

INVENIOSOFTWARE-CONTRIB / NG2-JSON-EDITOR

76%

DEFAULT BRANCH: MASTER

REPO ADDED <b>07 OCT 2016</b>	TOTAL FILES <b>57</b>	# BUILDS <b>280</b>	EDGE coverage <b>76%</b>	TOKEN HDwOVLInMISIRUJAHrXQjbtDTMy8DpE
----------------------------------	--------------------------	------------------------	-----------------------------	--

## LAST BUILD ON BRANCH MASTER

BRANCH: MASTER

COMMITTED 3 FEB 20 - 15:51

COVERAGE REMAINED THE SAME AT 76.271%

BUILD #	BUILD TYPE	COMMITTED BY	COMMIT MESSAGE	PULL REQUEST	RUN DETAILS
# 127	PULL #166 travis-ci	web-flow	WIP different-records: E2e tests for different record types	Pull Request #166: WIP different-records: E2e tests for different record types	4.92 hits per line 675 of 885 relevant lines covered

## RELEVANT LINES COVERED



SOURCE FILES ON MASTER

# End-to-End tests with Protractor

Protractor runs tests against your application running in a real browser, interacting with it as a user would.

<https://github.com/angular/protractor>

Documentation

# SchemaOption

## Index

### Properties

- `alwaysShow`
- `autoCompletionConfig`
- `columnWidth`
- `disabled`
- `enumShortcutMap`
- `hidden`
- `linkBuilder`
- `longListNavigatorConfig`
- `onValueChange`
- `priority`
- `refFieldConfig`

## Properties

### Optional `alwaysShow`

○ `alwaysShow`: *boolean*

Flag to show fields on the UI, even if they aren't present in the record.

### Optional `autoCompletionConfig`

○ `autoCompletionConfig`: *AutoCompletionConfig*

Configuration to autocomplete a field from remote or local source.

- Either `url` and `path` (for remote) or `source` (for local) must be set.

### Optional `columnWidth`

○ `columnWidth`: *number*

### SchemaOption

- `alwaysShow`
- `autoCompletionConfig`
- `columnWidth`
- `disabled`
- `enumShortcutMap`
- `hidden`
- `linkBuilder`
- `longListNavigatorConfig`
- `onValueChange`
- `priority`
- `refFieldConfig`

<https://github.com/TypeStrong/typedoc>

Automatic deployment to npm and github pages

# Done through Travis CI

## **deploy:**

provider: npm

skip\_cleanup: true

email: admin@inspirehep.net

api\_key:

secure: ZO0gp0WoyzYY6/UBbwJVlH8Dt0Vay2Dvc

## **on:**

tags: true

repo: inveniosoftware-contrib/ng2-json-editor

all\_branches: true

node: '6.9.1'

## **after\_deploy:**

- ./deploy-gh-pages.sh

*(extract of .travis.yml)*

Getting closer to the goal

Search or go

- \$schema
- abstracts
- accelerator\_experiments
- arxiv\_eprints
- authors
- collaboration
- collections
- control\_number
- external\_system\_numbers
- field\_categories
- keywords
- license
- page\_nr
- preprint\_date
- public\_notes
- publication\_info
- references
- report\_numbers
- self
- titles
- urls

Add field -

Enable Admin Mode

Schemas -

http://localhost:5000/schemas/records/hep.json

abstracts -

source	value
arxiv	Recent measurements of top-quark production at hadron colliders are reviewed. The inclusive top-quark pair production is determined at four centre-of-mass energies at Tevatron and LHC with experimental uncertainties that are close to the uncertainties in theoretical calculations at next-to-next-to-leading order in QCD. Several differential measurements are performed and compared to simulation. Production of single top quarks is studied in the three different production channels. Top-quark pair production with neutral and charged vector bosons has been observed by the LHC experiments. Finally, production of additional heavy flavour quark pairs ( $t\bar{t}b\bar{b}$ ), ( $t\bar{t}c\bar{c}$ ) is studied or searched for.

accelerator experiments -

curated relation	experiment	record	
<input checked="" type="checkbox"/>	CERN-LHC-ATLAS	http://localhost:5000/api/experiments/1108641	+ - x v
<input checked="" type="checkbox"/>	CERN-LHC-CMS	http://localhost:5000/api/experiments/1108642	x ^ v
<input type="checkbox"/>	FNAL-E-0890		x ^ v
<input checked="" type="checkbox"/>	CERN-LHC-LHCb	http://localhost:5000/api/experiments/1110643	x ^ v
<input checked="" type="checkbox"/>	FNAL-E-0823	http://localhost:5000/api/experiments/1110315	x ^

arxiv eprints -

categories	value
cond-mat	arXiv:1511.04200

Add new

authors -

full name -	Cristinzani, Markus
affiliations -	value
	Bonn U.
contributor roles -	value
	schema
curated relation -	<input type="checkbox"/>
ids -	type
	INSPIRE BA
	value
	M.Cristinzani.1
uid -	3b4b3e83-8e41-4301-a94e-8d9ca65774e2
+ -	

collaboration -

value	
ATLAS	+ - x v
GDF	x ^ v
CMS	x ^ v
DO	x ^ v
LHCb	x ^

collections -

primary	
ConferencePaper	x v
CONF	x ^ v
arXiv	x ^ v
Citeable	x ^ v

Show Preview



# Thank you

<https://github.com/inveniosoftware-contrib/ng2-json-editor>

<https://github.com/inspirehep/record-editor>