

# THERMAL NOISE DATABASE

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# Pro of a database solution

- ❑ Definition of a standard data format
  - ❑ data format has been defined over the “**Parameters and Constants used in the Advanced and Third Generations Interferometers noise calculations**” document
- ❑ It is a common container that permits:
  - ❑ Simple query, looking for a specific material, e.g. on the base on the name
  - ❑ More complex query, aggregating materials following user search criteria and particular parameters requirements or constrains
  - ❑ It uses a standard query language: SQL (**Simple Query Language**)
- ❑ Flexibility on output data organization and presentation
- ❑ The system can be attached to a web frontend and interrogated remotely

# Thermal noise DB organization

- ❑ At the moment the archive has been organized in two main sections, following the reference document requirements:
  - ❑ Materials properties tables
    - ❑ Here we classify a material with some general information like: name, class name, symbol, etc..
    - ❑ At each material we associate a list of properties type, such as:
      - ❑ 'Density' 'Young Modulus' 'Elastic Constants' 'Thermal Expansion' 'Infrared Refractive Index' as reported in the document
      - ❑ By design there are no limit in properties type that we can define
    - ❑ For each “property type” we associate a set of information, like:
      - ❑ Value of the property at 300 and others
      - ❑ By design there are no limitation in information set that we can define
  - ❑ Physical Constants tables
    - ❑ Classified by name, value, etc..

# Thermal noise DB subsystem

- ❑ Database base on MySQL 5.1 solution ([www.mysql.com](http://www.mysql.com))
- ❑ The user application is base on a Web interface written in PHP + javascripts
- ❑ During this developing phase it is hosted in one of the Perugia Virgo server.



# Thermal noise Web Interface

- ❑ A web interface has been developed in order to permit two main activity on database
  - ❑ New materials insertion.
  - ❑ User Query on material properties.
  
- ❑ Two Login authorization level
  - ❑ Guest user
    - ❑ Make query to the system
    - ❑ Do we need a special user for that of we want to provide a free access?
  - ❑ Publisher user



# Web User Interface: main

- Main functionalities:

- Explore archive content

- Edit or insert new materials

- A small how to, that describes how to use the system

**GW Detectors Materials DB**

- Home
- Explore
- Edit Materials ▶
- HowTo

**Introduction:**

Welcome to the Materials Database of the gravitational wave next/future. It has been designed in order to archive and provide technical and scientific data for the building of the next and future ground based gravitational wave detectors. The materials properties classes have been defined:

- Mechanical
- Thermical

# Web UI: Edit mode

- ❑ Selecting the corresponding “Edit Materials” button and than “Edit” the user can edit and existing material
  - ❑ With this option the user have to select first a material from a list
  - ❑ Decide to delete it or edit it.

The screenshot shows the 'Select Material to Edit' page. It features a navigation menu on the left with options: Home, Explore, Edit Materials (selected), and HowTo. The main content area has a table with two columns: Name and Subname. The first row is a header with 'Name' and 'Subname'. The second row contains 'Material Name' and 'Sub name'. The third row contains 'Silicon' and 'Silicon Crystal'. A red arrow points from the 'Silicon' entry to the right-hand screenshot.

Name	Subname
<a href="#">Material Name</a>	Sub name
<a href="#">Silicon</a>	Silicon Crystal

The screenshot shows the 'Edit Mode - Select Action' page. It features a navigation menu on the left with options: Home, Explore, Edit Materials (selected), and HowTo. The main content area has two sections: 'To Edit Material parameter:' with an 'Edit' button, and 'To Delete Material parameter:' with a 'Delete' button.

**Edit Mode - Select Action**

To Edit Material parameter:

To Delete Material parameter:



# Web UI: Insert mode step 1,2

- ❑ To insert a new material the user is guided by a “Wizard” through 3 insertion steps.
  - ❑ Material name/subname
  - ❑ Value@300K/reference and completeness..
  - ❑ Tables

### Material Insertion Wizard - Step 1

**Material Name**

Name

SubName

### Material Insertion Wizard - Step 2

#### Value- References and completeness

**Material Name**

Name test

SubName test

Mechanical	Value@300K	Reference	Completeness
Density	<input type="text"/>	<input type="text"/>	nd
Young Modulus	<input type="text"/>	<input type="text"/>	nd
Shear Modulus	<input type="text"/>	<input type="text"/>	nd
Elastic Costants C11	<input type="text"/>	<input type="text"/>	nd
Elastic Costants C12	<input type="text"/>	<input type="text"/>	nd

ND  
Good  
Sufficient  
Poor





# Web UI: View mode

## Material Data View

### Material Name

Name test

Subname test

### Mechanical

Density Value@ 300K: Completeness: nd

References:

Note Experimental Data Fitting Data

Den

Density Value@ 300K: Completeness: nd

References:

Note Experimental Data Fitting Data

Example:

xxxxxxx	xxxxxxx	xxxxxxx	xxxxx	xxxxx	xxx
223	863558082	863562057	0	""	1
223	863566373	863647684	0	""	2
223	863651222	863656308	0	""	3
223	863658170	863664741	0	""	4
223	863671684	863678716	0	""	5
223	863680497	863702124	0	""	6
223	863702298	863744870	0	""	7
223	863745155	863790731	0	""	8
223	863790875	863792835	0	""	9
223	863793073	863795050	0	""	10

Comments: xx  
others info: xx

Density Value@ 300K: References:

Note Experimental Data Fitting Data

```

reduce0(float *g_idata, float *g_odata, long *N)
{
    extern __shared__ float sdata[];

    // load shared mem
    unsigned int tid = threadIdx.x;
    unsigned int i = blockIdx.x*blockDim.x + threadIdx.x;

    if (i<*N) {
        // copy data to device shared memory
        sdata[tid] = g_idata[i];
        __syncthreads();

        // do reduction in shared mem
        for(unsigned int s=1; s < blockDim.x; s *= 2) {
            // modulo arithmetic is slow!
            if ((tid % (2*s)) == 0) {
                sdata[tid] += sdata[tid + s];
            }
            __syncthreads();
        }
    }
}
    
```

# Status

- ❑ Database architecture → completed
  - ❑ Updated the parameters list respect the reference document updates
- ❑ Web UI infrastructure → completed.
  - ❑ Some bug discovered and fixed
- ❑ Web UI interface →
  - ❑ 2 new parameters have to be added (this week)
- ❑ User authorization → Completed
- ❑ Backup policy → Completed
- ❑ Migration on Cascina site (TBD)

# General Info

Temporary Web UI URL:

<http://193.205.222.108/~leone/MaterialDB/index.php>

About DB/Web UI:

[leone.bosi@pg.infn.it](mailto:leone.bosi@pg.infn.it)

About Parameters/requirements:

[paola.puppo@roma1.infn.it](mailto:paola.puppo@roma1.infn.it)

[leone.bosi@pg.infn.it](mailto:leone.bosi@pg.infn.it)