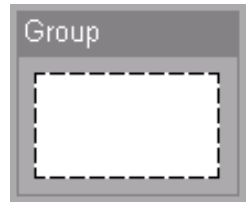


# More Rappature Objects

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## Use Group objects to group inputs together

**Tool Interface:**

Tool:

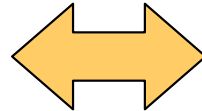
⊕ Input:

⊕ **Group: tau**

Number: taun

Number: taup

⊕ Output:



Minority carrier lifetimes

For electrons: **1e-6**

For holes: **1e-6**

Object: input.group(tau)    Rename    Help    Delete

**Label:** Minority carrier lifetimes

**Description:** Average time that it takes for a minority carrier to recombine, releasing energy in the form of phonons or photons.

Add label/description to groups

Minority carrier lifetimes

Average time that it takes for a minority carrier to recombine, releasing energy in the form of phonons or photons.

## Tool Interface:

Tool:

⊕ Input:

⊕ Group: tabs

⊕ Group: models

Boolean: recomb

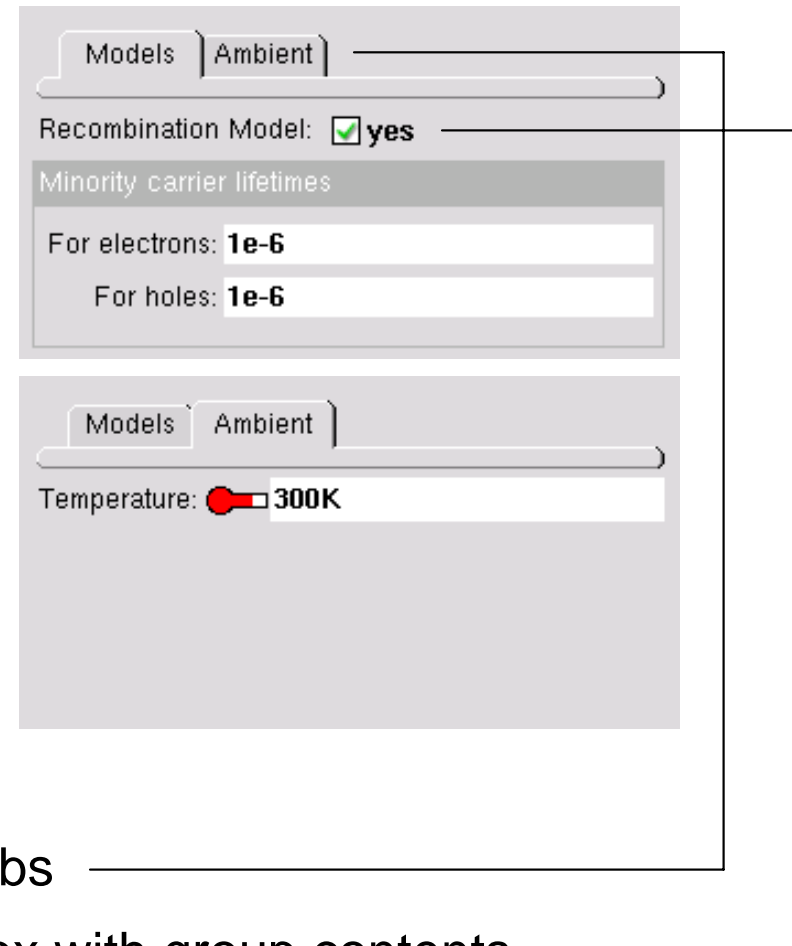
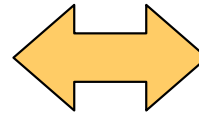
⊕ Group: tau

Number: taun

Number: taup

⊕ Group: ambient

Number: temp



Group of just groups  $\Rightarrow$  tabs

Group with other elements  $\Rightarrow$  box with group contents

## Use Phase objects to create input panels



### Tool Interface:

Tool:

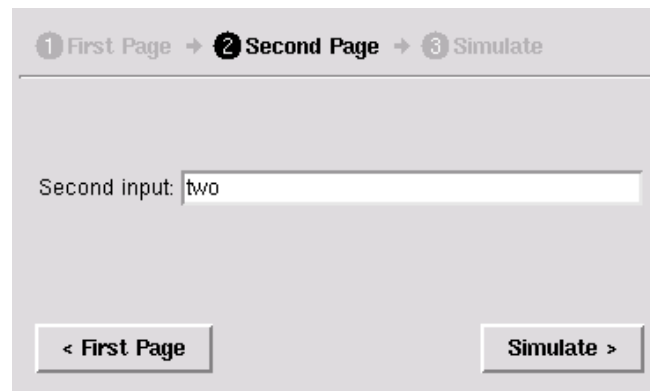
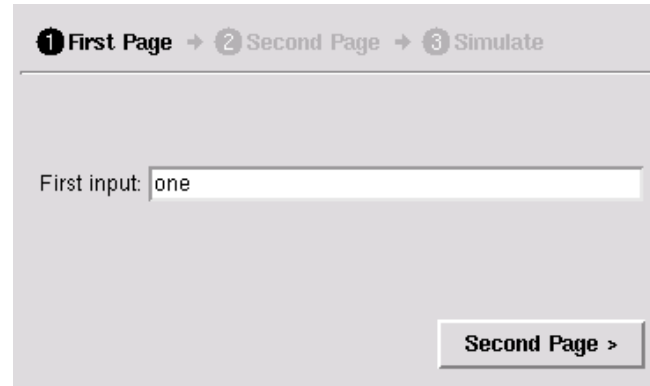
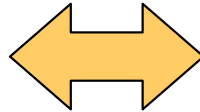
+ Input:

+ Phase: one

String: first

+ Phase: two

String: second



\* Use this sparingly--only if there are already lots of inputs and groups.

## Use Enable condition to enable/disable inputs

Drift-Diffusion Options

Recombination Model:  no

Minority Carrier Lifetime for electrons:

Minority Carrier Lifetime for holes:

Drift-Diffusion Options

Recombination Model:  yes

Minority Carrier Lifetime for electrons:

Minority Carrier Lifetime for holes:

boolean enables/disables number entries

**Tool Interface:**

Tool:

⊕ Input:

- Choice: model
- ⊕ Group: dd
  - Boolean: recomb**
  - Number: taun
  - Number: taup
- ⊕ Group: bte
  - Number: temp
  - Integer: secret
- ⊕ Group: negf
  - Number: tbe

Object: **input.group(dd).boolean(recomb)** Copy

**Label:** Recombination Model

**Tool Interface:**

Tool:

⊕ Input:

- Choice: model
- ⊕ Group: dd
  - Boolean: recomb
  - Number: taun**
  - Number: taup
- ⊕ Group: bte
  - Number: temp
  - Integer: secret
- ⊕ Group: negf
  - Number: tbe

Object: input.group(dd).number(taun) Rename

**Label:** Minority Carrier Lifetime for electrons

**Description:**

**Enable:** input.group(dd).boolean(recomb)

**Default Value:** 1e-6

2

Paste (ctrl-Y) into the Enable condition of each number

1 Copy the path for the boolean

## Enable condition can be an expression

Quantum Mechanical Options

Tight-binding Energy: **2.99eV**

High-energy lifetime: **10ns**

Quantum Mechanical Options

Tight-binding Energy: **3.01eV**

High-energy lifetime: **10ns**

number value  
enables/disables  
number below it

**Tool Interface:**

- Choice: model
- ⊕ Group: dd
  - Boolean: recomb
  - Number: taun
  - Number: taup
- ⊕ Group: bte
  - Number: temp
  - Integer: secret
- ⊕ Group: negf
  - Number: tbe
  - Number: tau**
- ⊕ Output:

---

Object: input.group(negf).number(tau) Rename

**Label:** High-energy lifetime

**Description:** This is used only when the tight-

**Enable:** input.(negf).(tbe):eV >= 3

**Default Value:** 10ns

Get the value of the  
tight-binding energy  
number

Convert  
to eV

input.(negf).(tbe):eV >= 3

Enable High-energy lifetime  
whenever tbe >= 3

## Use Enable condition to enable/disable whole groups

Model:

Drift-Diffusion Options

Recombination Model:  no

Minority Carrier Lifetime for electrons:

Minority Carrier Lifetime for holes:

Group

Enable:

Model:

Boltzmann Transport Equation Options

Temperature:

Group

Enable:

Model:

Quantum Mechanical Options

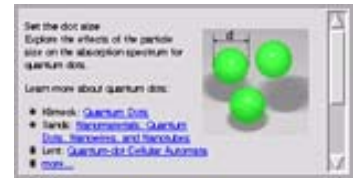
Tight-binding Energy:

High-energy lifetime:

Group

Enable:

## Use Note objects to embed documentation



**Tool Interface:**

Tool:

Input:

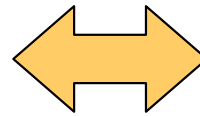
- Note: note
- Number: diameter
- Integer: num

Output:

---

Object: input.note(note)    Rename    Help    Delete

HTML File:    file://docs/bysize.html    **Choose...**

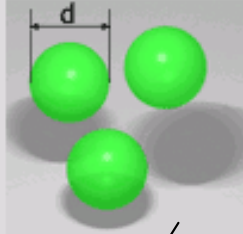


**Set the dot size**

Explore the effects of the particle size on the absorption spectrum for quantum dots.

Learn more about quantum dots:

- Klimeck: [Quantum Dots](#)
- Sands: [Nanomaterials: Quantum Dots, Nanowires, and Nanotubes](#)
- Lent: [Quantum-dot Cellular Automata](#)
- [more...](#)



Particle diameter d:

Number of particles:

Set an ordinary HTML file

```

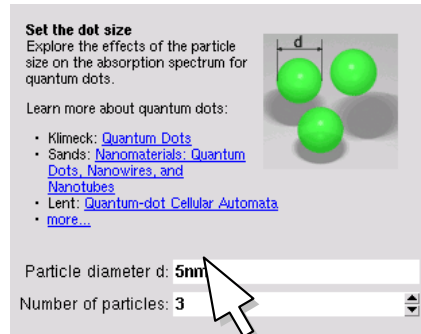
Color xterm
$ ls
docs/ note.tcl  tool.xml
$ ls docs
bysize.gif  bysize.html
$ █
    
```

Can reference images and other HTML files in the same directory, or using absolute http:// paths



## Note can pop up external web sites

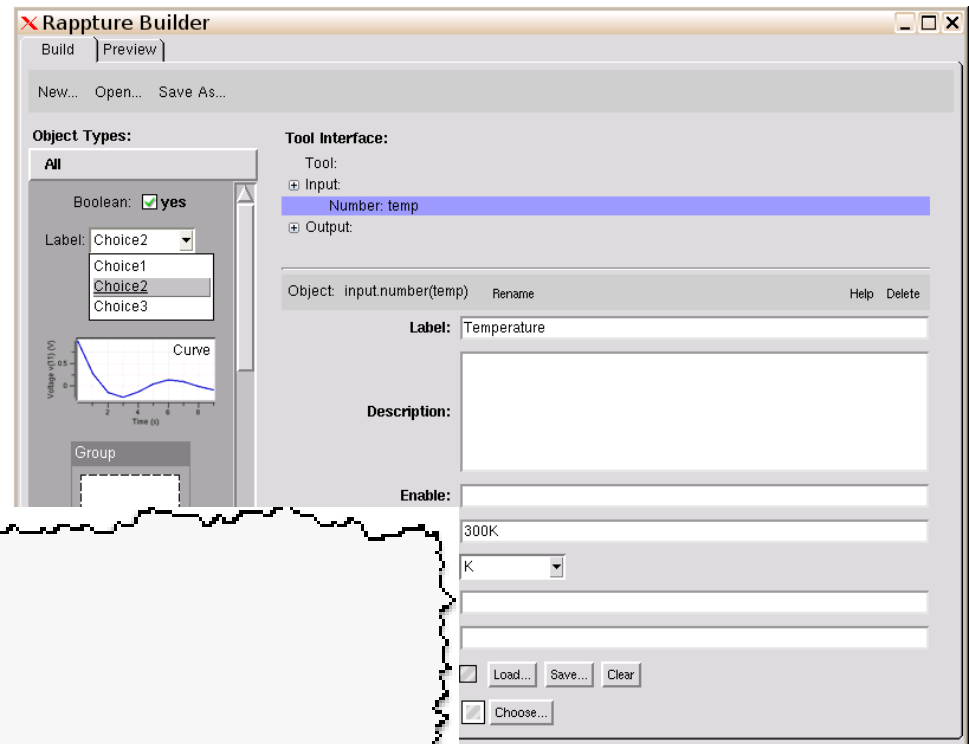
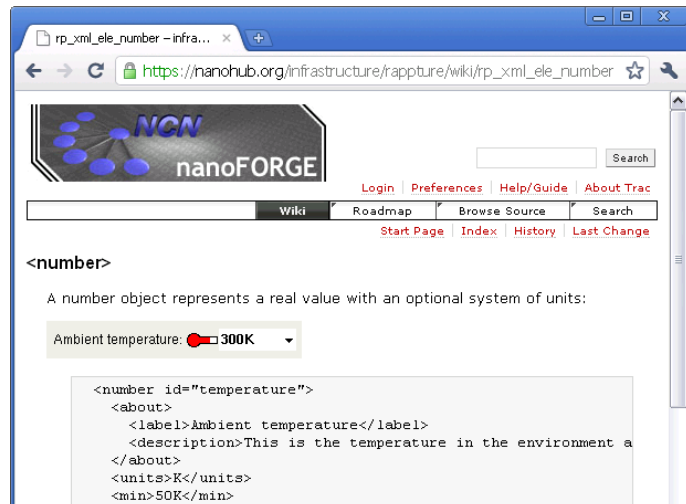
Example: *bysize.html*



```
<html >
<body>
<p>

<b>Set the dot size</b><br/>
Explore the effects of the particle size on
the absorption spectrum for quantum dots.
</p><p>
Learn more about quantum dots:
<ul style="margin: 0px; padding-left: 16px;" >
<li>Klimeck: <a href="http://www.nanohub.org/resources/189">Quantum Dots</a></li>
<li>Sands: <a href="http://www.nanohub.org/resources/376">Nanomaterials: Quantum Dots, Nanowires, and Nanotubes</a></li>
<li>Lent: <a href="http://www.nanohub.org/resources/148">Quantum-dot Cellular Automata</a></li>
<li><a href="http://www.nanohub.org/resources/tags/quantumdots">more...</a></li>
</ul >
</p>
</body>
</html >
```

## The builder is great, but it's not perfect

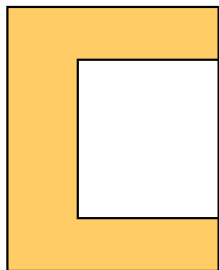
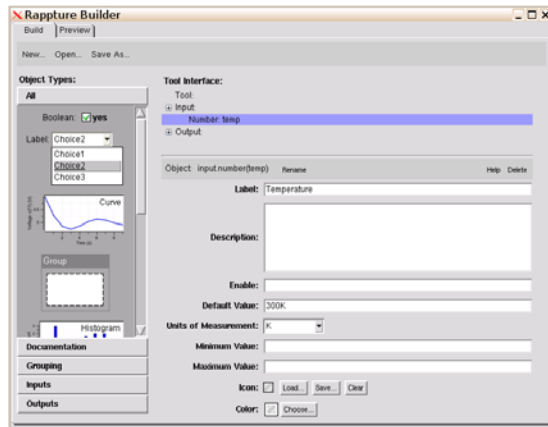


```

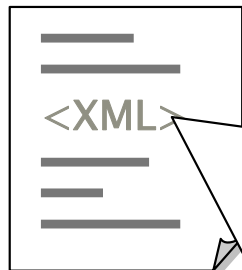
<max>1000K</max>
<default>300K</default>
<preset>
  <value>300K</value>
  <label>300K (room temperature)</label>
</preset>
<preset>
  <value>77K</value>
  <label>77K (liquid nitrogen)</label>
</preset>
</number>
  
```

*Where are the preset controls?*

## Builder



skeleton program



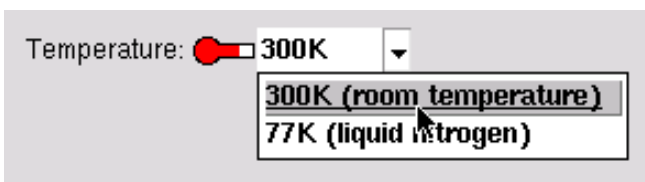
tool.xml

```

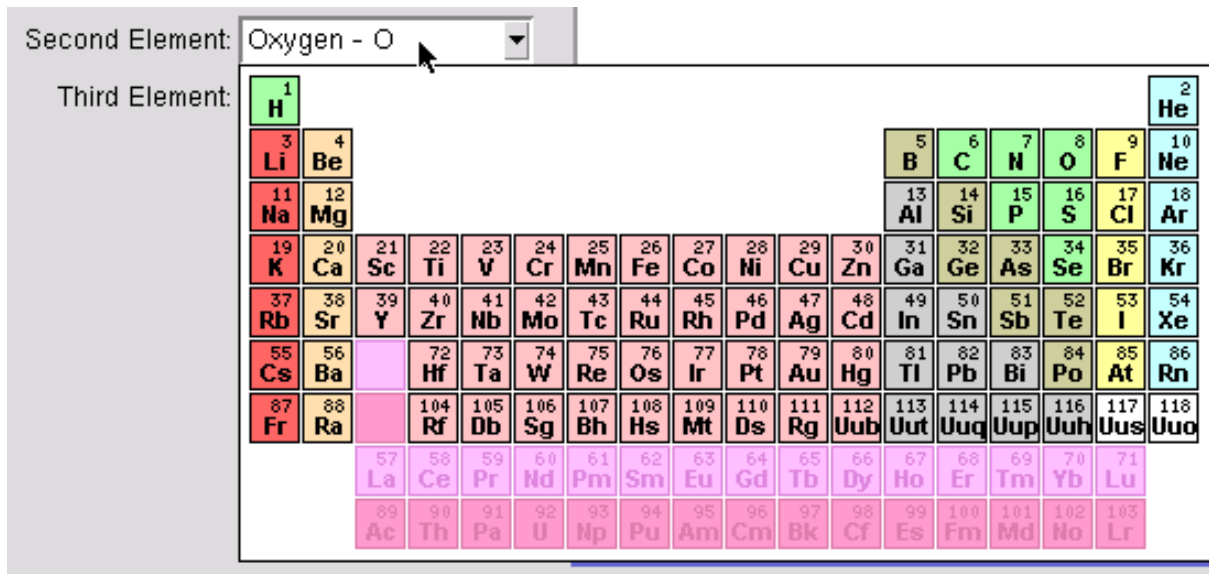
<?xml version="1.0"?>
<run>
  <tool>
    <title>Example with temperature</title>
  </tool>
  <input>
    <number id="temp">
      <about>
        <label>Temperature</label>
      </about>
      <default>300K</default>
      <units>K</units>
      <preset>
        <value>300K</value>
        <label>300K (room temperature)</label>
      </preset>
      <preset>
        <value>77K</value>
        <label>77K (liquid nitrogen)</label>
      </preset>
    </number>
  </input>
</run>

```

You can add stuff like this by hand



## Prompt for elements from the periodic table



actinoid  
alkali-metal  
alkaline-earth-metal  
halogen  
lanthanoid  
metalloid  
noble-gas  
other-non-metal  
post-transition-metal  
transition-metal  
unknown

<input>

<periodicelement id="second">

<about> <label>Second Element</label> </about>

<default>0</default>

<inactive>lanthanoid actinoid</inactive>

<returnvalue>symbol </returnvalue>

</periodicelement>

...

weight  
number  
name  
symbol  
all

- Add a note at the very top
- Add a “model parameters” tab and a “comments” tab
- When comments are enabled, produce an output string with comments

note

boolean

string

Enable/disable based on the boolean