

## 9 WEBSITE DEVELOPMENT

Simon Bevan

**Website address:** <http://pc26.hep.ucl.ac.uk/3c41/>

As part of the project brief, a number of tasks were stated in respect to building and maintaining a website. More specifically: -

- *Understand the basics of web design and moving/editing files under the Linux operating system with a view to maintaining a web -site for the project.*
- *Assemble suitable material that can be used as the basis of a visual presentation (PowerPoint) to schools on the physics of cosmic rays and their detection. This material should also be maintained on a web page.*
- *Maintain a web-based listing of minutes of meetings and actions arising.*

A template of the website was designed by Dr David Waters and Dr Mark Lancaster. This involved a title page and what is now in the Project Brief menu. The web site was expanded from this.

To complete these tasks successfully, it was decided that the web site must: -

- 1) be designed so that the entire group has easy access to all of the research and data that the group has produced.
- 2) be designed so that it can be used in the final presentation.
- 3) be readily accessible and easy to use. This is so it can be used as a source of information for school children

Storing work this way has many advantages. Firstly, there is easy access to all of the work completed by the group anytime and anywhere, providing that there is an Internet connection. Once on the site, all of the work is organised and hence easy to navigate to find the required information.

Secondly, the site is easily updated. This has the advantage that all of the group can be updated without the need for meetings. This was especially important for our group as the only opportunity we all had to meet was the scheduled group meetings. With so many different group members doing different things, to have the research instantly accessible by everyone had obvious advantages.

Another advantage is that work can be retrieved from the site, rather than having to find the correct person who has the required information and borrowing the original copy. This means that the work can read/analysed by more than one group member at any time. Also, unlike disks or paper, work cannot be lost once on the site.

The last important advantage is that work cannot be altered without the 'web master' knowing. This means that no one can change things that were not meant to be changed.

The website had to look good and still be easy to use. To achieve this, the title page uses a java applet which gives a 'funky' menu. The applet took up the whole screen

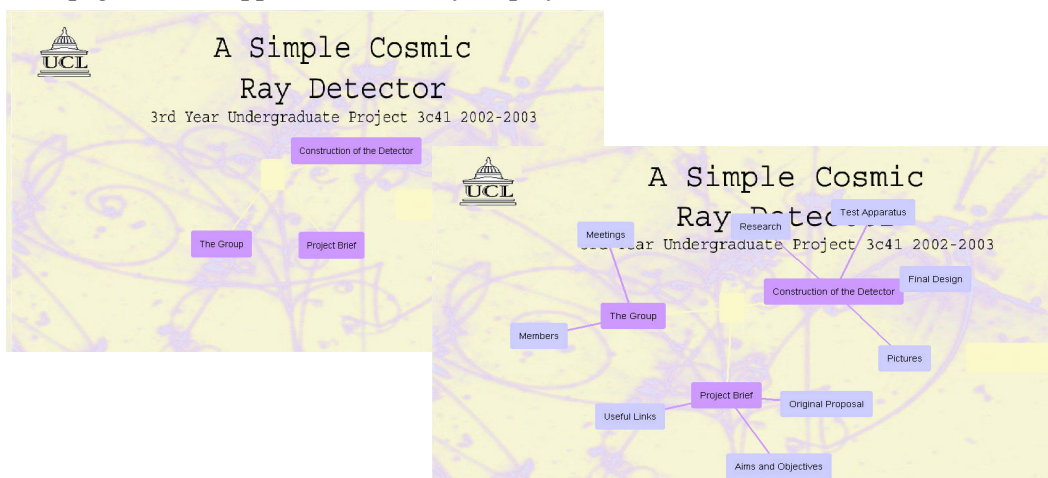
and the background had to be designed on PhotoShop. Successive pages use flashing bullet points. The background is consistent throughout and is a bright detection chamber picture.

Unfortunately there was no access to a program which could have changed word documents into .pdf, so the word documents are saved as .htm files. This works fine, but unfortunately some of the pictures in the word documents were incorrectly formatted.

The work was all uploaded onto the site using SSH secure shell, and connecting to ftp.socrates.ucl.ac.uk. Uploading work in this way allowed easy access to pc26, the website server, from any computer.

## Index page

This page uses an applet, which firstly displays the three main section menus.



On clicking on these menus more options pop from them. These options are all links to the corresponding pages.

## The Group

These two pages contain contact details of the group, and group meetings. The group members page contains the names of all group members and supervisors, and an easy

### List of group members

**Students:**

Frederic Bell	fbell@ucl.ac.uk
Caroline Roberts	caroline@ucl.ac.uk
Simon Brown	simon.brown@ucl.ac.uk
Mario Aron	mario.aron@ucl.ac.uk
Rebecca Wong	rebecca@ucl.ac.uk
Manuel Korken	manuel@ucl.ac.uk

**Supervisors:**

Dr. Mark Lancaster	mark.lancaster@ucl.ac.uk	Tel: 020 7679 714
Dr. David Waters	david.waters@ucl.ac.uk	Tel: 020 7679 714

### Group Meetings

Group meetings are Fridays 10:00-12:00 in D17.

#### Minutes

- 17/01/03
- 28/02/03
- 24/01/03
- 07/03/03
- 31/01/03
- 14/03/03
- 07/02/03
- 14/02/03
- 21/02/03

**Minutes from meeting**  
(16 February 2003)

All group members were present with additional attendance of two members from group 1 to review group performance (mid term).

Meeting commenced with discussion of the results obtained during the week. These were coincidence measurements performed by Rebecca and Simon. They analysed the results and found that performance was higher on one side of the scintillator than the other with a range of 20 to 25 counts in the interval for which readings were recorded. In the region of 1.5 to 3 minutes a gap tended to arise between counts which occurred frequently. Each set of a straight line.

Caroline then gave a brief overview of the experiment for the benefit of the group reviewers and an explanation of the coincidence unit.

Next the discussion moved to the results obtained for two way coincidence counted out by Caroline and Simon with the reading recorded every 10 seconds the 5 minutes interval due to the rapid count rate. The group were asked to look at the results for the two way coincidence counted to be more consistent. Then so much of a gap occurring between counts with two way coincidence compared to three way. One of the group reviewers thought the result was more than a board number (Waters) explained that Cosmic Rays are regular rather than in bursts. In comparison last week's data showed a gap of about 2.5. Reviewers required whether the group were planning to undertake experimental work but it was decided that the detector would partly be for demonstrating that experimental work.

High counts were recorded for single channels along the top with differences observed between results obtained last week and this week. Affairs might not be a lot to need to compensate.

Caroline explained that Derek had machined a piece of scintillator which was slightly thinner and had been drilled down the middle with depth at wavelength shifting fibre (WSP) and glue. The scintillator was wrapped in polystyrene and a special type of paper which was good for reflecting light back. Caroline said that the number one priority had to be to produce a final design due to the time consuming nature of the actual making. Channel efficiency were considered, how often a hit was obtained out of the DMTC. The possibility of 1, 2, 3 or even 4 way coincidence needed to be considered also. The same step could be moved making it possible to see how count rate varies with the overlap area.

Next on the agenda was the more theoretical side of the project, the data data. Important since a prediction of the rate allows a comparison to be made results obtained. A much higher result would imply a subsequent amount of noise. This data calculation was worked on both by Manuel and 3.

The group meetings page details the time of group meetings and the minutes from each meeting. The minutes are detailed in word html files. This allowed easy copying of the files for the final report.

These pages detail the original material that was provided for the project.

## Construction of the Detector

# Research

- [Composition of Cosmic Rays](#)
- [Origin of Cosmic Rays](#)
- [Flux and energy distribution](#)
- [Scintillators](#)
- [Spark Chambers](#)
- [Cherenkov Radiation](#)
- [VMDL](#)

## Scintillation Detectors

**What is a scintillator?**

A scintillator is a material which converts some of the energy deposited by charged particles to visible light. The charged particle is generally not in motion interaction with a ray or gamma photon.

**Scintillators can be split into organic and inorganic substances.** In nuclear medicine only inorganic scintillators are normally of interest, in particular sodium iodide. The majority of photon energies used. There is interest in Bismuth Germanate (BGO) for the detection of high energy photons. Translucency involved are as common to all of the scintillators.

**Properties of Scintillators**

The main properties of interest for a scintillator include:

- Its ability to absorb energy from the incident radiation which is related to its atomic number and density
- The fraction of absorbed energy which is converted to light photons
- The spectrum of wavelengths of visible photons which it emits
- The shape of the light output produced. The trailing edge of the pulse is general assumed to be exponential with decay constant quoted

Material	Wavelength of Max Emission	Decay Constant (ns)	Refractive Index	Density (g/cm <sup>3</sup> )	Scintillation efficiency rel. to NaI(Tl)
NaI(Tl)	415	0.23	1.85	3.67	100
CaF <sub>2</sub> (Mg)	420	0.63	1.84	2.93	85
BaF <sub>2</sub> (Ce)	430	0.5	2.15	7.75	8
CaF <sub>2</sub>	395	0.075	1.55	2.5	10

**Table 1 Properties of some common scintillators**

## Results

## Results

- Initial Results - 2301103
- Advancing Initial Results for Noise - 2301103
- Noise - 2401103
- Detection of Noise Source - 2901103
- More 250v results - 2901103
- EMT Warm Up Time - 3001103
- Various 3 way Conduces and 030203
- Various 2 Way Conduces and Conduces with 2 Way Conduces - 04/0203
- Area Testin - 11/0203
- Single Scavenger Results - 11/0203
- Moveable Scavenger Results - 13/0203

### Alms

To test various 3 way conduces and see if there is any difference.

**Apparatus**

See figs 1, 2, and 3 in the Initial Testing report.

**Method**

The results were taken in the same way as the results on 2301103, see method in Initial Testing report

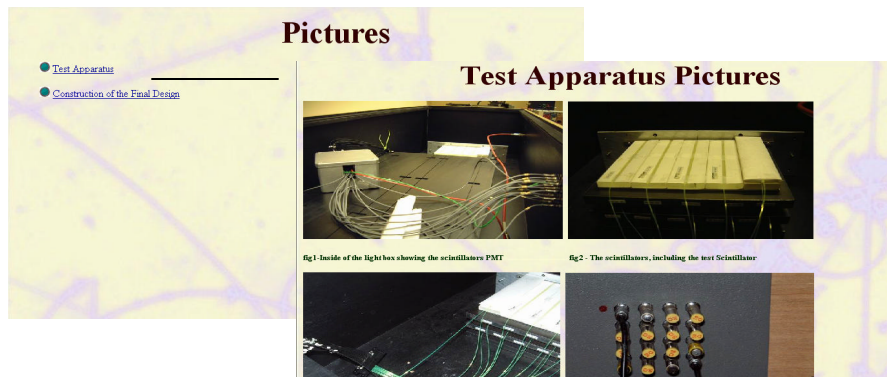
**Results**

	2301103	2401103	2901103	2901103	3001103	030203	04/0203	11/0203	11/0203	13/0203
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
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18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0
28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
31.0	31.0	31.0	31.0							

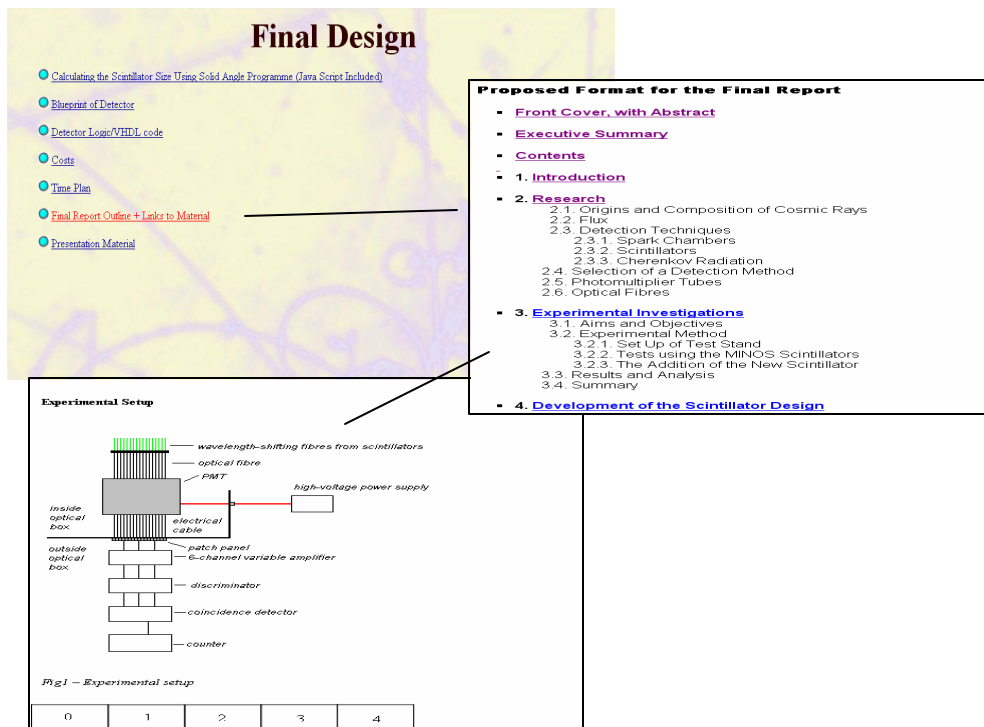
This section details the research that was carried out by the group. Again each section represents a link to another document. An example one of the documents is shown.

## Pictures

The pictures page is split into two section, and will be extended to three when the detector is complete. One section shows pictures of the test apparatus, the other shows pictures of the building of the detector. When the detector is constructed a further section will be added showing the detector in its full glory.



The final design section details the work that was needed to build the detector, for example the VHDL code and the calculation of the scintillator panel size. This section also details the costs, time plan and proposed format for the report. The proposed format of the report contains links to all the material that has been completed for the



report. For example above the experimental investigations section is shown.

For website structure, see Appendix XIII

