WEBWATCH

Colour, glorious colour

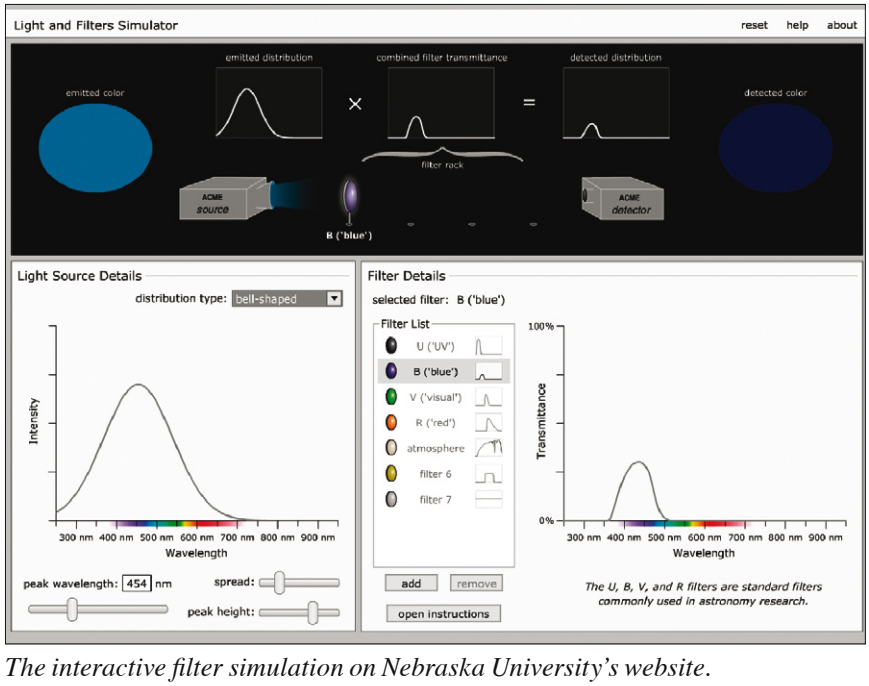
Continuing the use of *del.icio.us*, all the links for this edition can be found at http://del.icio.us/PhysicsEducation/Nov07. If anyone has any strong opinions about this, do drop me an e-mail at ggilchrist@nerklegroup.co.uk.

Straight down to the business of colour then—Taiwan University has produced a series of Shockwave and Java animations that clearly demonstrate mixing light and the use of filters. One of the applets provides a visual demonstration of an area that students often confuse: mixing light compared with mixing paint. Once on this website, explore and you will find a good selection of applets to support your classroom teaching.

Taiwan is just one of the universities behind *CoLoS*—conceptual learning of science. One of the cornerstones of *CoLoS* is the Physlet builder. This is a free-to-use toolkit for producing your own Java simulations of physical events. For example, you can create an interactive simulation of the electric fields around two point charges with half a dozen mouse clicks. The simulations can be saved and linked to for later classroom use. The *CoLoS* site also has an active forum with literally hundreds of user-submitted simulations.

One site that probably does not need introduction is Gareth Pitchford's *Primary Resources*. Click through to the science section and you will find a good selection of lesson plans, animations and interactive whiteboard activities. I particularly liked the experimental details for determining the effect on size of shadow by varying the distance from the light source to the object. This is one that will find its way into my classroom.

Back to filters for the moment—Nebraska University's astronomy department has produced a comprehensive simulation of the use and design of filters. Suitable for higher GCSE and A-level (ages 15–18), it lets you alter the



The interactive filter simulation on Nebraska University's website.

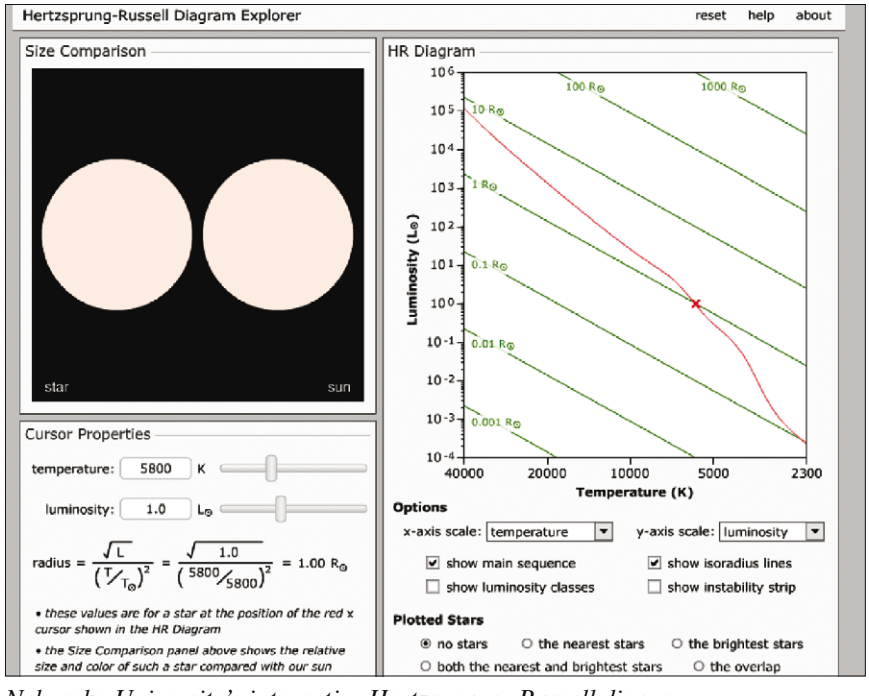
spectral distribution of the source from a black body—our Sun or any spectral profile you like—from 300 nm to 900 nm. You can define your own filters in a similar manner, choosing from predefined 'band pass' to any profile you can imagine (see figure). It is possible to build up a selection of four filters and observe the transmitted distribution.

It's not often that you come across a site that seems to offer so much, but Nebraska University just keeps delivering. So far I have found an interactive Hertzsprung–Russell diagram, a wonderful lunar phase simulator and a thought-provoking simulation of planetary gas retention. What makes these simulations stand high above the rest is that each is accompanied by a comprehensive set of lecturer and student resource material. They're well worth a visit.

Sticking with the space theme, *ScienceProf* provides a very visual demonstration of red shift. You choose the direction and magnitude of your velocity and the simulation shows how a reference spectrum is shifted either to the red or the blue, depending on your direction and speed. The American Museum of Natural History has a parallel simulation, this time scaffolded with teaching notes, making it a good resource to recommend for independent study.

In an excellent crossover between physics and chemistry, Fontis Media has breathed new life into an old favourite. Its interactive guide shows you how to make and use a red-cabbage indicator (see overleaf). It takes the next step and begins to explain how and why the colour of the indicator changes in acid and basic conditions. The inspiring part is that Fontis goes on to explain the colour changes in terms of the different absorbance properties of the cyanidin molecule in different pH conditions.

One thing that's interested me in the world of LEDs is: how are white LEDs made? Answering this and many other LED questions is *LED Center*. It's worth a visit to use its series/parallel LED circuit designer. Just type in the number of



Nebraska University's interactive Hertzsprung–Russell diagram.

LEDs and their characteristics, and the applet will design your circuit for you. And now I know that white LEDs are blue LEDs with a phosphor coating that emits a yellow light—the mixture of blue and yellow sort of makes white.

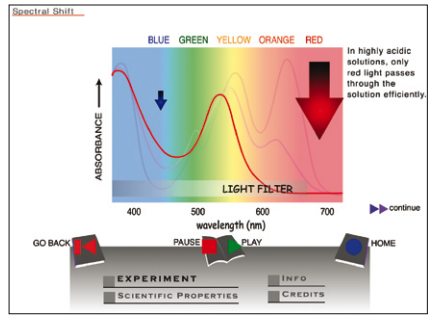
Talking of blue things, one of the popular questions at the moment seems to be 'Why is the sky blue?' It must have been on a TV programme recently. California University hosts the *USENET Physics FAQ*, which has an excellent and reasoned physical explanation of the colour of the sky. In one article it links Tyndall, Rayleigh and Einstein, and it shows that the sky over Mars could be blue if the conditions were right.

For an experiment that we can't really try here in the UK, have a look at Towson University's description of the triboluminescence of wintergreen candy. Why can't we do it in the UK? We can't seem to buy the correct candy.

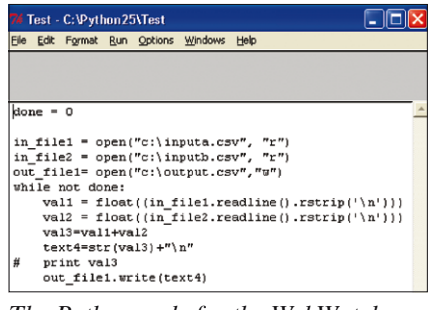
Now let's go back to our data analysis exercise from the last edition of *Physics Education*. To recap—analyse 100 000 lines of data outside Excel. Having tried JustBASIC, this time I was all set to investigate Visual Basic Express, the free package from Microsoft. After downloading the 3 Mb preloader and waiting while the remaining 80 Mb installed itself over my broadband connection, I fired up VB Express and went to work. I am disappointed to say that, after nearly 12 hours of coding, consulting numerous help files and posting 'HELP' pleas on internet forums, I gave up and switched to Python instead.

After downloading to 10 Mb installation I had access to both the command line and the GUI version of IDLE—the Python integrated development environment. Python is heavily influenced by C and Perl, both languages that I have never coded in before. It was with great satisfaction that, after only 45 min, I was able to complete the challenge.

If you are looking to learn a more modern language than BASIC without the overheads and learning curve of C, C++ or C#, then I suggest downloading a copy of Python.



Fontis Media's spectral shift of red-cabbage indicator.



The Python code for the WebWatch programming challenge.

Finally, the *Insultingly Stupid Movie Physics* website lays bare the obsession of Hollywood with rewriting the laws of physics. The site has enough material to fuel many an A-level discussion, from a debate on 'laser beams' through to a reasoned argument about why action heroes wouldn't survive jumping/falling from a third-storey window. Each section is accompanied by details of the relevant physics so that you can assess the validity of the argument. A number of films are reviewed and dissected, and I couldn't help but check out the review of one of my favourites, *K19: The Widowmaker*. Interestingly, I seem to have missed some of its foibles, so now I'm off to watch it again.

Glen Gilchrist