

Version

2.1

virtual radiography™

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shaderware.com

Lecture VR

virtual radiography™  
shaderware.com

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## User Guide

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## Minimum Hardware Requirements

*This section will explain the hardware and operating system requirements of virtual radiography™.*

All the virtual radiography™ suite of programs require a computer with a fast graphics card. The computation of a single virtual radiograph requires literally billions of calculations. Until recently this was not possible in reasonable times. Our first version relied on the computers CPU, and took nearly 2 minutes to create an image of less complexity than those you will create in a few hundredths of a second. This incredible advance has come from utilising gaming technology.

## The Graphics Card (Display Adapter)

Modern computers come with either built in graphics on the mainboard, or a separate graphics card. Computers with only a mainboard graphics chip will not run virtual radiography™.

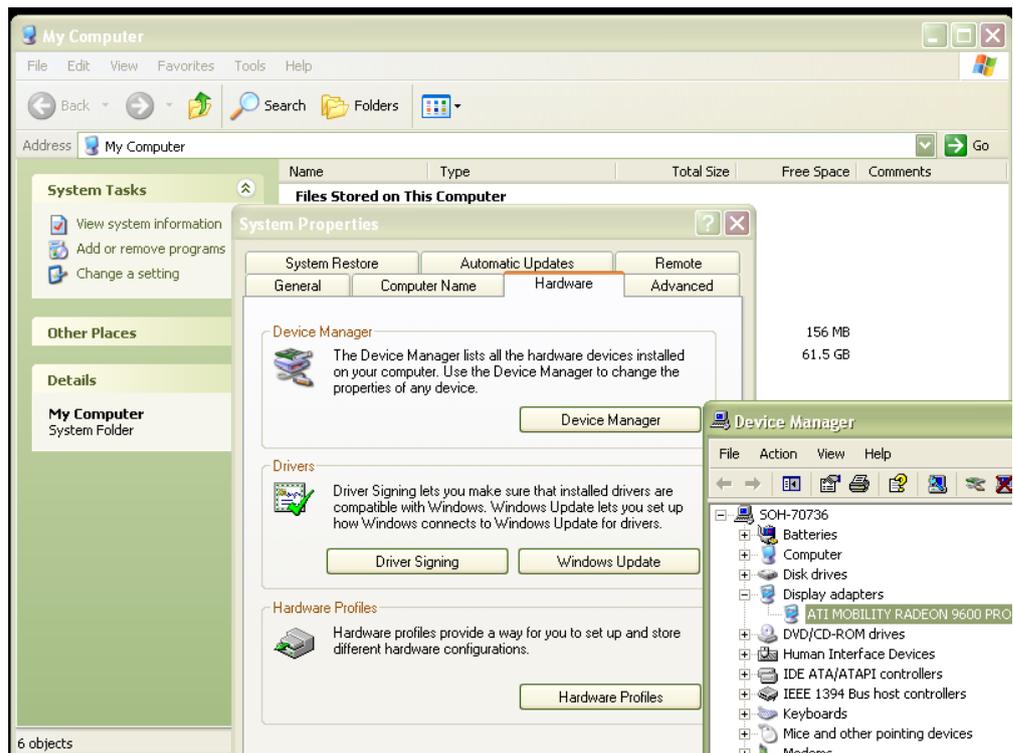
I C O N   K E Y	
	Valuable information
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	Keyboard control
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As with the premium features of Vista, the key technology required is the ability to hardware render in Shader model 2.0 or higher. The current list of acceptable graphics cards is available on the shaderware website. It is important to note the

graphics card manufacturers do not follow logical numbering sequences; An ATI Radeon X1950 will greatly outperform an ATI Radeon HD2400 for example.

If you are in doubt about your computers performance, check the exact display adapter installed by selecting Start\My computer\view system information\device manager\

Once you have this information you can email [hardware@shaderware.com](mailto:hardware@shaderware.com) for an up to date list of all those cards certified by us.



**Figure 1. Identifying the graphics card using device manager under MS windows XP**

## Memory Requirements

virtual radiography™ does not require huge amounts of RAM. 256mb should be adequate in a compatible machine.

## Hard Disk Requirements

It would be wise to have approximately 1.5Gb of hard disk space available.

## CPU Requirements

The CPU is not taxed in any way as most of the processing is conducted by the graphics card. A reasonably conservative machine with a 1.5Ghz processor or higher should be adequate.

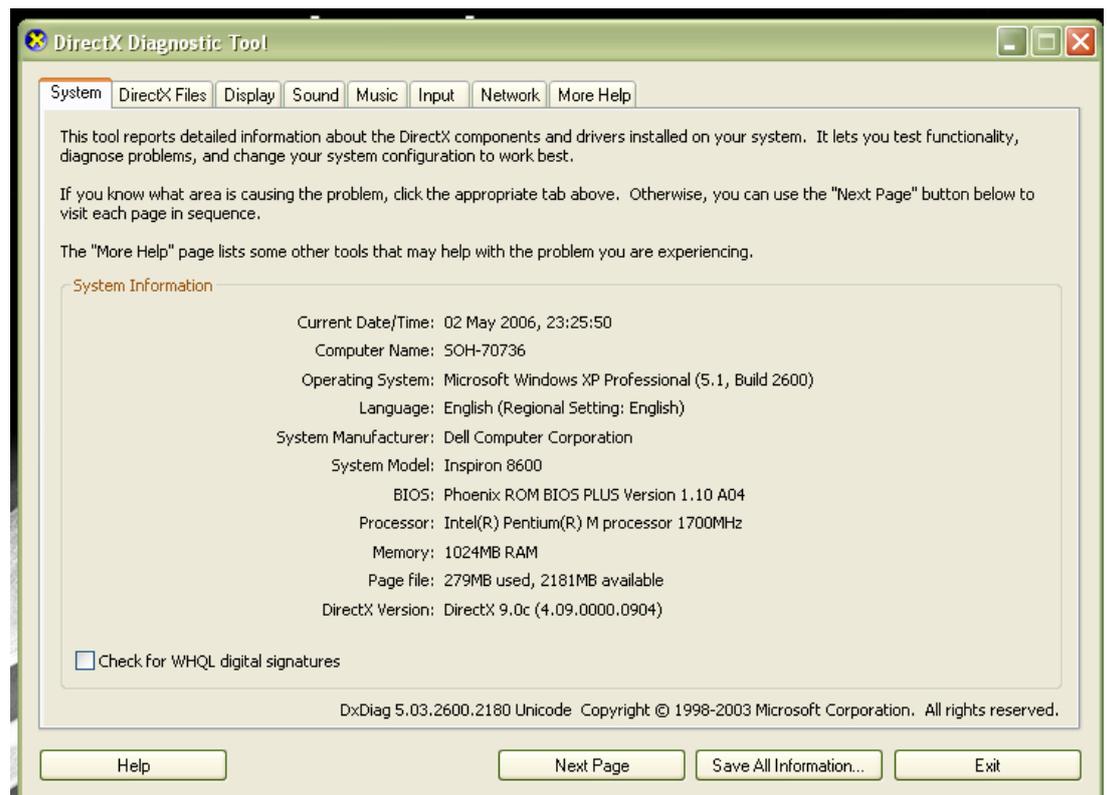
## Operating Systems Supported and other Software Requirements

Windows 2000, XP and Vista have all been certified. The graphics card should be running the most up to date drivers. Updates can usually be downloaded from the graphics card manufacturer's websites.

virtual radiography™ requires DirectX 9.0c or higher to operate, Vista incorporates this software, in XP, This can be checked by selecting Start\run\ and typing the command dxdiag in the dialog box.



Figure 2. Checking the graphics card using the 'dxdiag' routine



**Figure 3. An example of the ‘dxdiag’ routine output**

The last line will report the version installed. The latest version of DirectX can be downloaded free of charge from [www.microsoft.com/directx/](http://www.microsoft.com/directx/)

Any doubt about the suitability of your hardware, if you would like advice on purchasing new systems to run virtual radiography<sup>TM</sup> or if you have a hardware compatibility problem, you should contact us at [hardware@shaderware.com](mailto:hardware@shaderware.com)



If your current computer lab of student workstations does not have suitable graphics capabilities, it can usually be converted to run virtual radiography by simply purchasing and installing reasonably priced graphics cards. This may add up to \$80 (£60) per workstation to the cost.

## Installation of the software

*This section will explain how to install the software from our website. If you have purchased media, please skip to page 8.*

To install purchased software from our website, or to download one of our periodic free updates navigate to <http://www.shaderware.com/> or select Start\Programs\shaderware\LectureVR\VirtualRadiography on the Web.

It is our policy to offer updates to our software for licence holders periodically; any updates within a particular version will be free, updates to a new version may be chargeable. If a critical update is required between these dates, this will be communicated to registered users by email.

Supported browsers Our site is designed to support Internet Explorer v5.0 or above, Mozilla Firefox, and Safari at screen resolutions of 1280 x 1024 or above; other browsers cannot be guaranteed to work.

### Downloading the Archive Files

All the virtual radiography™ suite of programs come in compressed archive form. These must first be saved to a suitable local hard drive location; we suggest that you create a directory C:\downloads\shaderware\



Warning: Large Files

virtual radiography™ software utilises the Visible Human Data (VHD) under licence from the National Library of Medicine, USA (NLM). The size of the archive will depend on the modules you have purchased. We recommend you do not attempt to download the archives on a dial up connection.

### Download Dialogue Boxes

When downloading anything from a website your local security settings will determine the exact behaviour of your computer. You can trust that we have done everything we can do to ensure the content of our

archives is safe for you to download. Despite this reassurance, your computer will likely flag up a security warning like this one.



**Figure 4. Example security warning on download**

The above example download can take about 20mins on a broadband connection to complete. If you are unsure, you should contact us. If you are happy to continue, please select the Save option and select your chosen location.



Most workplaces have policies and procedures for installing software on workplace computers. Please consult your Information Technology (IT) department before commencing installation.

## Running the Installer

The installer needs to be run on each workstation that the software is to be used on.

If you are intending to install and use virtual radiography™ on a machine with multiple users, the software will automatically create desktop icons, program items and taskbar icons for the current user. If the current user is logged in as administrator, icons should be available for all users who subsequently log in.

Double click the setup icon to start the install procedure. Please allow 30 minutes per machine to install and configure the software fully.

shaderware has decided not to participate in the digital signature system currently operating. This message may therefore appear on setup



**Figure 5. Example of a security warning on setup**

## Obtaining the Licence Files

The software is supplied as a single time limited evaluation copy. In order to use the software after this trial period it is necessary to enter valid registration key.

If you have already purchased the software and received your keys, you can enter them using the supplied registration utility, a short cut to which can be found in the shaderware entry in the windows start menu.

If you have evaluated the software and wish to continue using it after the trial period, please contact shaderware at [sales@shaderware.com](mailto:sales@shaderware.com) or visit the web-site at [www.shaderware.com](http://www.shaderware.com) for detail of how to purchase the software.

## Using LectureVR

*This section will explain how to use the real time demonstrator tool, which is quite different to other virtual radiography<sup>TM</sup> modules.*

### Outline of features

LectureVR 2.1 is intended for use with a projector working at 800x600 or greater screen resolution and 24 bit colour or greater. It is designed to provide real time changes to the radiographic image to support lectures and workshops with larger student groups. It features:

- Image updates in real time (genuine “fluoroscopic” performance)
- Demonstration of the isocentric principle (cassette fixed perpendicular to central ray)
- Easy manipulation of positioning parameters in real time (SID, OID, cranio-caudal angulation, PA, PA obliques, Lateral, AP Obliques, AP and canting)
- Easy manipulation of “beam energy” and “beam intensity” in real time.
- Psuedo 3D effect for bony anatomy
- Demonstration of changes in receptor characteristics in real time (HD curves)
- Ability to save demonstration images

## Patient Movements in LectureVR

No attempt to model the radiography room, cassette, bucky or tube is made. The image is presented immediately on the screen and changes in patient position, collimation, SID, OID, kVp, mAs and HD curve can be applied. The results of these changes are immediately displayed, making this a very powerful tool.

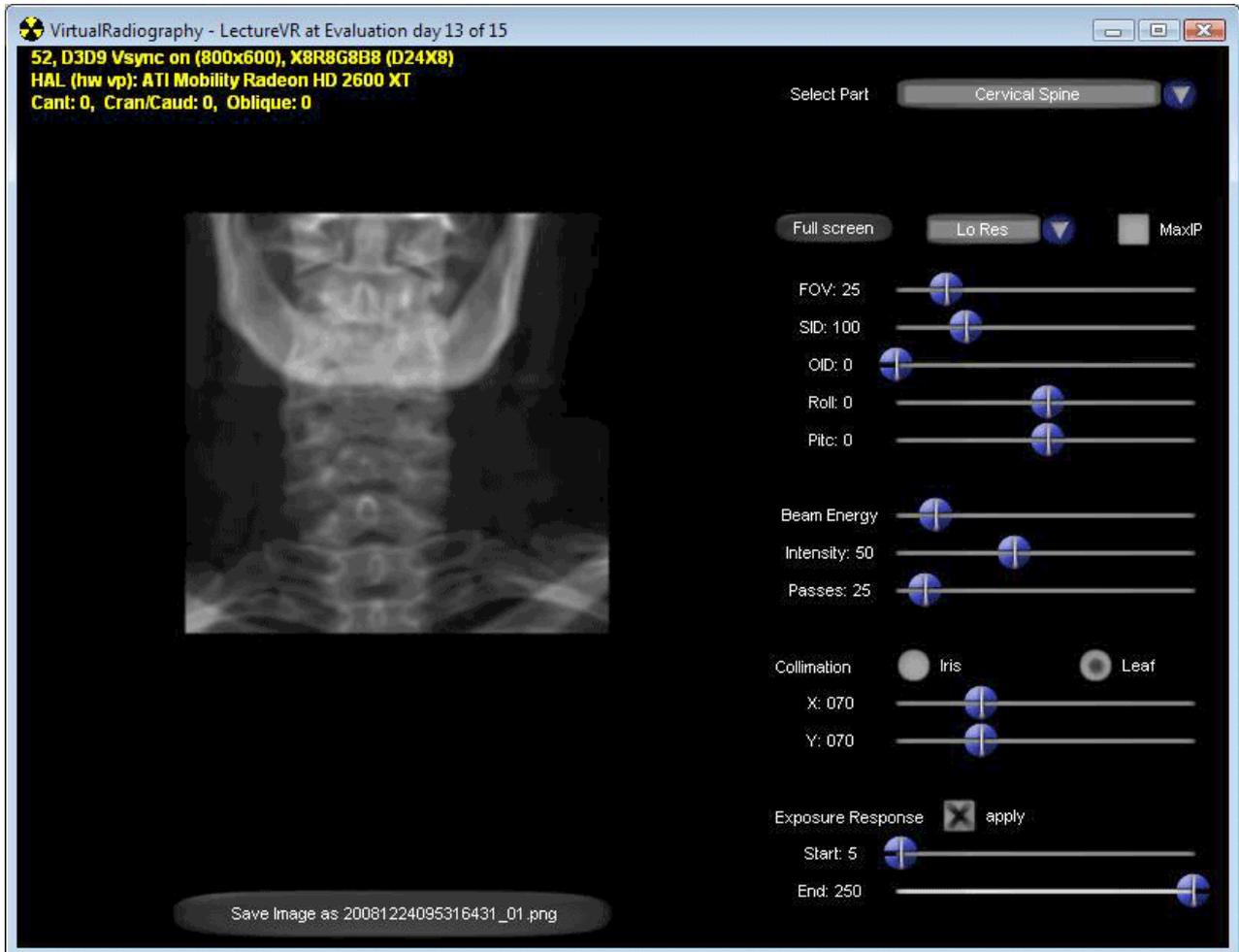


Figure 6. The LectureVR interface

## Central Ray position

The central ray is notionally the centre of the imaging area. This area is to the left of the window. The position of the central ray can be moved in relation to the patient. This Translation is affected by I and K for inferior and superior, J and L for left and right.

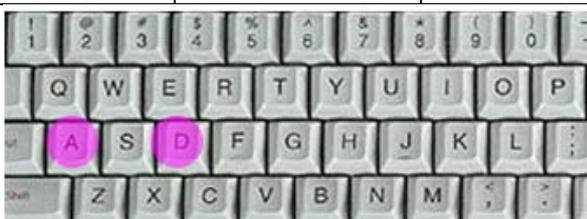
## Patient Rotation or Angulation

The receptor is always perpendicular to the central ray. The distortion will be different compared with similar angles to the patient in virtual radiography™ 3.1 as in a common bucky system there will be added

distortion due to the added angulation to the cassette. LectureVR uses a true isocentric system to reduce the number of variables.

Axial (Oblique) Rotation is affected by the A and D keys the angulations can be interpreted according to the table below.

Oblique	AP, AP Oblique	Lateral, Lateral Oblique	PA, PA Oblique
A + D keys	0-45, 315-360	45-135, 225-315	225-135



Sagittal (Cranio-Caudal) angulation is affected by the W and S keys the angulations can be interpreted according to the table below

Cranial-Caudal	Cranial Angulation	Caudal Angulation
W + S keys	90-270	270-90



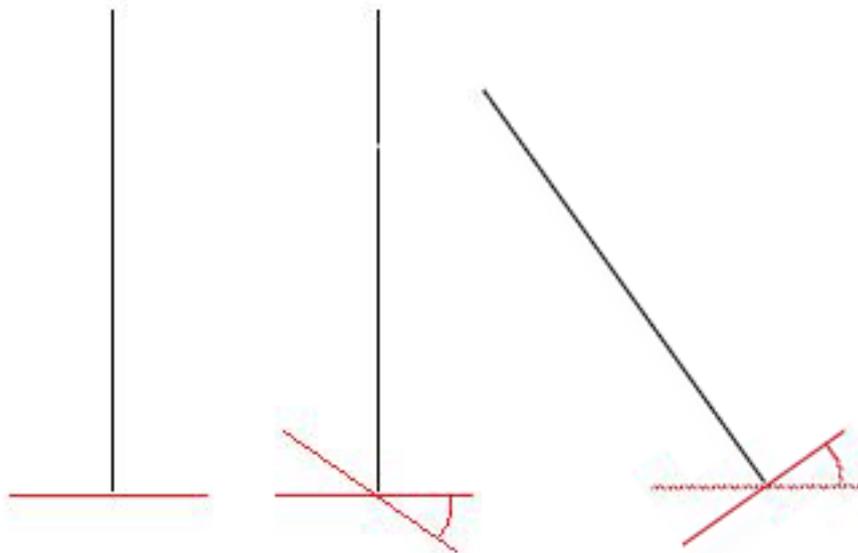
Coronal Rotation (Canting) can be controlled by Q and E keys



NOTE – To reset the position at any time Use the Hotkey 'T'.

## Cassette Angulation

Most examinations taken with angulation (crainial, caudal or cross-table) will involve angulation against the cassette.



**Figure 7. A) central ray normal to cassette, B) angulation of cassette to central ray, C) angulation of central ray against cassette**

In LectureVR 2.1 the angle of the cassette to central ray can be altered. The control is by two sliders called 'pitch' and 'roll'. The user could loosely consider 'pitch' to be crainio/caudal and 'roll' to be cross-table but this is not always the case – it depends on the patient position. An example of their use follows...

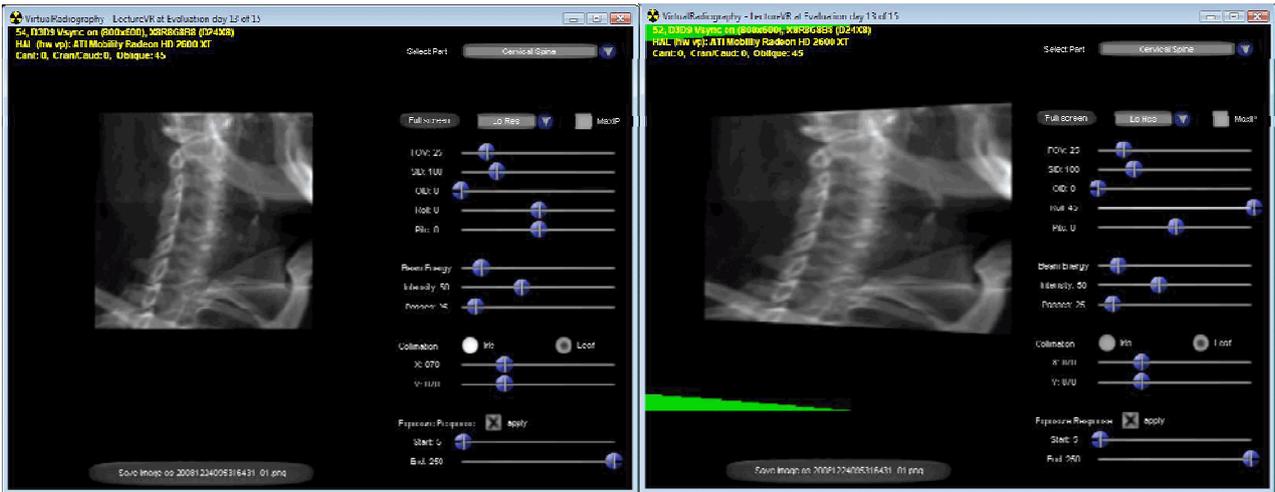


Figure 8. Isocentric LPO projection of c. spine on left; cross table LPO projection on right showing added distortion (roll is set to +45 degrees)



Figure 9. Isocentric AP Crainial 20 projection of Sacrum (on the left); the same projection with 20 angulation to the cassette as if taken in a table bucky (pitch set to -20)

## Other Controls

<b>Factor</b>	<b>Control</b>	<b>Range</b>
Source Image Distance	Slider	50-400cm
Object Image Distance	Slider	0-50cm
Beam Energy	Slider (in steps)	40-140 (units are not calibrated to kVp)
Beam Intensity	Slider	0-255 (units are not calibrated to mAs)
Collimation	Sliders	None (iris or rectangular)
Receptor response HD curve shape**	Sliders	Variable

### NOTES

\*\* The receptor response is an “S” shaped curve. The “S” shape response will be like film/screen. The response can be ‘windowed’ using the sliders. This allows a narrow or wide latitude receptor to be modelled. A fast or slow receptor can also be modelled.

## Interface controls

**Select Part:** You can choose from any of the available body parts by using the drop-down menu (a quick method is available from the 'hotkey' P)

**Full Screen:** LectureVR can be made to take up the whole screen by pressing the 'fullscreen' button.

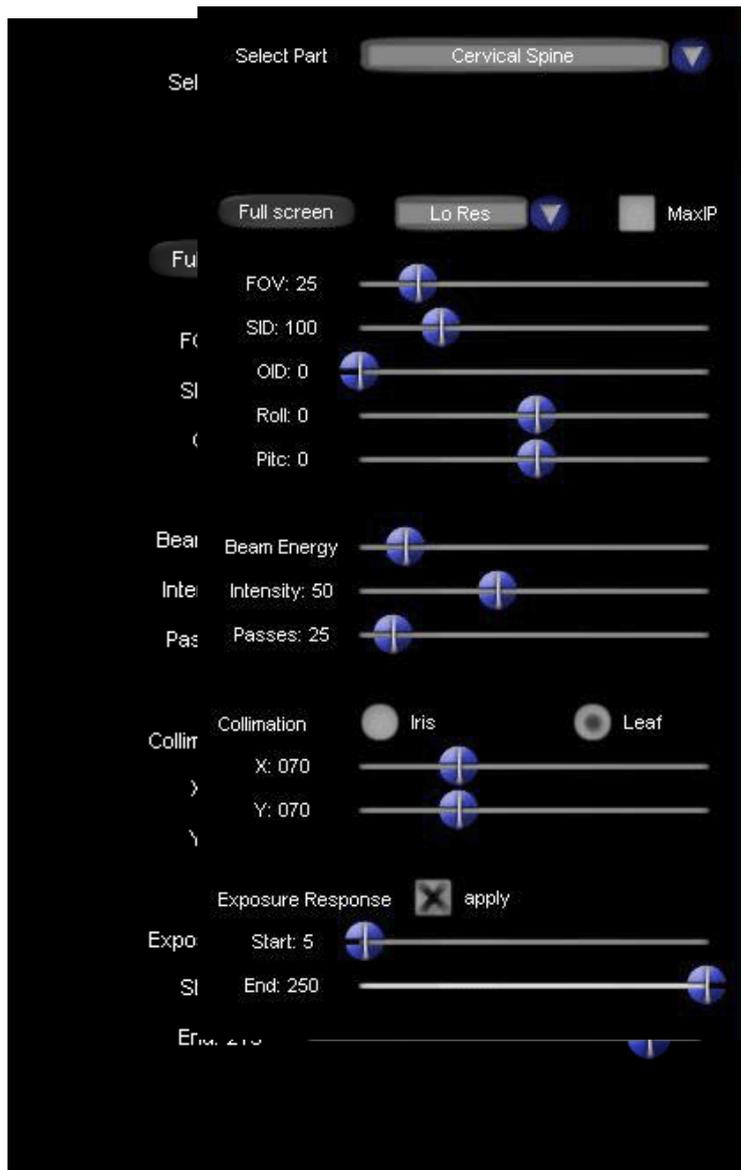
**Resolution:** The resolution of the Digitally Reconstructed Radiograph (DRR) can be changed between Low/Moderate/High. The higher the resolution, the longer the computation time; this may cause jerky movements.

**MaxIP:** This instigates a 'Maximum Intensity Projection' which simulates a 3D effect. This may be helpful in visualising bony anatomy.

**FOV:** The 'field of view' can be altered. The larger the field of view the smaller the DRR will appear. Reducing the FOV will allow a small part of anatomy to be displayed large on the screen.

**Passes:** The larger the number of passes the software makes across the data, the better the image quality but the longer the computation time- set this low if you experience jerky movements.

**Save Image As:** The translucent button on the image allows the displayed image to be saved in: My Documents\shaderware\LectureVR\savedimages. This can then be imported into a MS PowerPoint presentation or MS Word document.



**NOTES:**