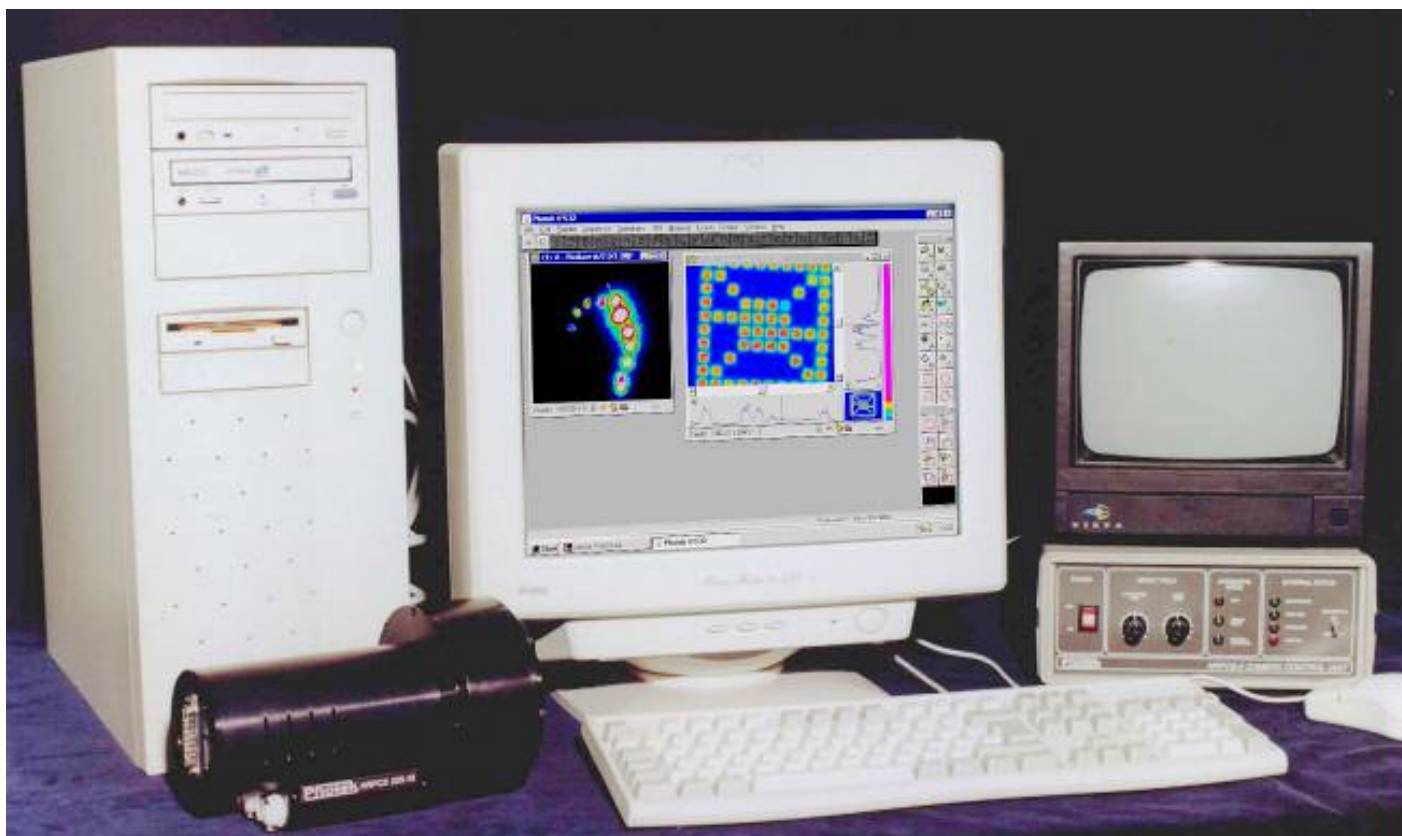


HIGH RESOLUTION PHOTON COUNTING SYSTEM



FEATURES

- ❑ Extreme sensitivity with single photon counting capabilities
- ❑ Automatic centre of gravity detection ensures high resolution in photon counting mode
- ❑ Bright field mode with real time video output for focussing
- ❑ Photon co-ordinates can be spooled to a sequential disk file during data acquisition
- ❑ Powerful sequential file analysis software provides post experiment time resolved image analysis
- ❑ 18, 25, 40 and 75mm image intensifier options.

APPLICATIONS INCLUDE

- ❑ Bio and chemiluminescence
- ❑ Measurement of acquirin, luciferase and ATP expression
- ❑ Simultaneous fluorescence and luminescence
- ❑ Measurement of rate constants
- ❑ Analysis of micro-titre plates
- ❑ Multiple wavelength imaging
- ❑ Contact imaging of samples
- ❑ Astronomy
- ❑ Autoradiography
- ❑ X-ray photon counting

INTRODUCTION

HRPCS-2 is a development of Photek's highly successful "High Resolution Photon Counting System" which was established in 1994 as a result of a EUREKA project "Phobia". Certain aspects of the system are subject to ESA patents for which Photek has a license.

This second generation photon counting system offers a true single photon counting sensitivity camera along with high spatial resolution. The heart of the system is based around one of a range of Photek's photon counting cameras. This, together with a camera control unit, proprietary PCI interface card (for PC compatible computers) and IFS32 data acquisition and image processing software completes the package.

The complete system comprises a photon counting camera, camera controller, PCI interface card, IFS32 software and a PC compatible computer running Windows 95/98. The recommended minimum specification computer is a Pentium 166 with 64Mb ram and 4Mb video card. The interface is a full length PCI card with bus mastering capabilities.

Bright Field Mode

The bright field mode of operation reduces the gain of the image intensifier to a maximum of a few thousand. This mode allows the user to adjust the gain of the camera and allows optimal levels to be achieved for the recording of bright field images. The following modes of operation are available:

- Live display for focussing the camera
- Grab single frame (8 bit data)

Photon Counting Mode

In photon counting mode, the gain of the image intensifier is increased such that every detected photon event is easily discriminated from CCD background noise. Operating modes are as follows:

- Centre of gravity detection of photon events and integration into buffer
- Real time display of the image during image integration.
- Spooling of detected XY events to a disk file for post experiment analysis
- Real time graph showing count rate trends
- Status window showing integration progress parameters.
- Timed Integration mode

Time Sequence Integration

Time sequence integration allows the user to set-up multiple integrations. For example, it is possible to set the camera to take up to 24 separate images. The integration time and a delay between images is also programmable.

Time sequence integration can be controlled by an optional remote handset. Integration can be started by the press of the handset button. A LED is used to indicate integration completion.

The software can also control a room lamp. It can be arranged that the lamp is automatically switched off when the photon counting mode is selected.

Frame Tag coding

Each frame of video may be tagged with a four bit user defined code. For example, this could be used to indicate the wavelength of a filter in an optional stepping filter wheel.

When analysing the sequential file, it is then possible to generate separate images or sequences of images for each tag code.

Programmable Filters

A novel feature of our system is the programmable neutral density (ND) filter. This allows photon counting and time resolved experiments to be carried out even if the incident light falling on the detector is too high for normal operation.

Fixed settings of ND0 through to ND5 give six decades of signal attenuation. User defined levels are also available.

Protection

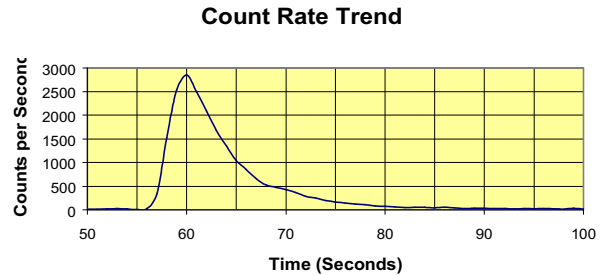
The HRPCS has a number of optional interlocks which prevent the camera been switched on if for example a door is open or a lamp is on.

In addition to this, the video signal is monitored and the camera switched off even if a small area of the detector is over illuminated.

Sequential File Analysis

The co-ordinates of all detected photon events may be written to a disk file for further analysis. Various tools are provided for analysing and re-constructing time resolved images. These include:

- The generation of a count rate trend graph. This shows how the count rate of an experiment changes on a second to second basis. This may be based on the whole image or up to six selected areas.



- The ability to generate a single image from any defined time domain, for example to see the image generated by the photons detected in time range 20 seconds to 70 seconds of a given experiment. This allows unwanted information to be removed from the image.
- Generation of a sequence of images from a given start time, integration period and the number of images.
- To regenerate images using pixel binning techniques to enhance the S/N ratio of a given image and to conserve memory when large image sequences are generated.
- To generate multiple sequences of images based on frame tag coding.

Camera Options

Photek can offer a range of photon counting cameras to suit a wide range of applications. Most of our cameras are self contained units and include the image intensifier, high voltage power supply, fibre taper coupled CCD camera. Our range of cameras is constantly changing and adapting to users requirements. Some of our range is listed below:

- ICCD325** This model incorporates a 25mm photon counting image intensifier coupled to a CCIR/RS170 video camera via a reducing fibre optic taper. It is ideal for microscope imaging applications and for use with 1" C mount camera lenses.
- ICCD340** This is a 40mm photon counting camera again coupled to a CCIR/RS170 video camera. Its main use is in contact imaging and auto-radiography applications.
- ICCD80X325** Large format cameras using our DM80 demagnifying image intensifiers are ideal for X-ray photon counting applications.
- VCCD325** This is a special "open faced" camera for use in vacuum systems.

Special high frame rate and asynchronous camera options are also available.

Other Related Information

See other datasheets including:

- Photon Counting Cameras
- HRPCS Applications Notes
- IFS32 Software
- Image Intensifiers
- Photocathodes

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